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COMMUNICATIONS-ELECTRONICS COMMAND



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ADVANCE PLANNING  
BRIEFING FOR INDUSTRY

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“SOFTWARE ACQUISITION STREAMLINING”

SHERATON EATONTOWN HOTEL & CONFERENCE CENTER  
OCTOBER 20, 1993

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**UNITED STATES ARMY  
COMMUNICATIONS-ELECTRONICS COMMAND**



**FORT MONMOUTH, NEW JERSEY**

**ADVANCE PLANNING  
BRIEFING FOR INDUSTRY**

**"SOFTWARE ACQUISITION STREAMLINING"**

**SHERATON EATONTOWN HOTEL & CONFERENCE CENTER  
OCTOBER 20, 1993**



DEPARTMENT OF THE ARMY  
HEADQUARTERS, US ARMY COMMUNICATIONS-ELECTRONICS COMMAND  
AND FORT MONMOUTH  
FORT MONMOUTH, NEW JERSEY 07703-5000



REPLY TO  
ATTENTION OF

Office of the Commanding General

Ladies and Gentlemen:

On behalf of the Communications-Electronics Command (CECOM) and the C3I community, I am pleased to present to you the proceedings of the Software Acquisition Streamlining Advance Planning Briefing for Industry (APBI). The purpose of this briefing is to provide industry with a thorough understanding of the Software Acquisition Streamlining Process, focusing on the Streamlined Acquisition Approach, Software Standards and Reuse.

Government and Industry must continue working together to meet the Army's needs with lower operational and support costs. I want to share with you the software engineering initiatives at this Command and welcome your feedback to help bring the traditional software acquisition problems under control.

I welcome your participation in our APBI program.

Sincerely,

*Otto J. Guenther*

Otto J. Guenther  
Major General, U.S. Army  
Commanding

**NOTICE**

This publication contains the briefings presented during this Advance Planning Briefing for Industry (APBI). Following the APBI a Proceedings Book containing these briefings, any revised charts, and any information disclosed by the government during the conduct of the one-on-one sessions will be published. Copies of the Proceedings Book may be obtained, for a minimum fee, by contacting the Defense Technical Information Center (DTIC). The telephone number is (703) 274-6867.

We hope that the above publications prove beneficial to your long-range planning efforts. If you have any additional questions and/or suggestions please contact the Program Analysis and Evaluation Directorate, AMSEL-PE-OD, ATTN: Mari Aufseeser, (908) 532-5054.

# **DISCLAIMER**

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**THE OVERALL CLASSIFICATION  
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**ADVANCE PLANNING BRIEFING FOR INDUSTRY**

**OCTOBER 20, 1993**  
**SHERATON EATONTOWN HOTEL AND CONFERENCE CENTER**  
**EATONTOWN, NEW JERSEY**

**MEETING CHAIRMAN**  
**MR. JOHN H. SINTIC**  
**DIRECTOR, SOFTWARE ENGINEERING, CECOM**

**AGENDA**

**WEDNESDAY, OCTOBER 20, 1993**

- 0700      **REGISTRATION**
- 0815      **ADMINISTRATIVE REMARKS**
- 0825      **WELCOMING REMARKS**  
COL Domenic F. Basile  
Deputy Commander for Business,  
CECOM
- 0845      **APBI OVERVIEW**  
Dennis J. Turner  
Software Engineering Directorate, CECOM
- 0900      **SESSION I: SOFTWARE STANDARDS AND TECHNIQUES**  
**SESSION OVERVIEW AND INTRODUCTION**  
**MODERATOR**  
Mr. John T. LeBaron  
Software Engineering Directorate, CECOM
- 0910      **SOFTWARE DEVELOPMENT DOCUMENTATION (SDD) AND ITS IMPACT**  
**ON FUTURE ACQUISITIONS**  
Mr. Jeffrey Herman  
Software Engineering Directorate, CECOM
- 0930      **SOFTWARE MODELING AND SIMULATION**  
MAJ Gordon W. Robson  
Software Engineering Directorate, CECOM
- 0950      **SOFTWARE ARCHITECTURES AND REUSE AND ITS IMPACT**  
**ON SOFTWARE DEVELOPMENT**  
Mr. Gerald R. Brown  
Software Engineering Directorate, CECOM
- 1015      **QUESTIONS AND ANSWERS**
- 1030      **BREAK**

- 1050 SESSION II: STREAMLINING THE ACQUISITION APPROACH**
- SESSION OVERVIEW AND INTRODUCTION**
- MODERATOR**  
Mr. George E. Sumrall  
Software Engineering Directorate, CECOM
- 1100 STREAMLINED ACQUISITION GUIDANCE**  
-DOCUMENTATION-STREAMLINING AND REVIEW PRACTICES  
-REDUCTION OF DATA ITEM DESCRIPTIONS  
-RISK ABATEMENT PLAN  
Mr. Andrew C. Mills  
Software Engineering Directorate, CECOM
- 1125 SOFTWARE CAPABILITY EVALUATIONS AND THEIR IMPACT ON THE SOURCE SELECTION PROCESS**  
Mr. Jeffrey Herman  
Software Engineering Directorate, CECOM
- 1150 STREAMLINED INTEGRATED SOFTWARE METRICS APPROACH**  
Mr. Stewart Fenick  
Software Engineering Directorate, CECOM
- 1220 CECOM SOFTWARE OMBUDSMAN**  
Dr. Martin I. Wolfe  
Software Engineering Directorate, CECOM
- 1230 QUESTIONS AND ANSWERS**
- 1245 CLOSING REMARKS**  
Mr. John H. Sintic  
Director, Software Engineering, CECOM

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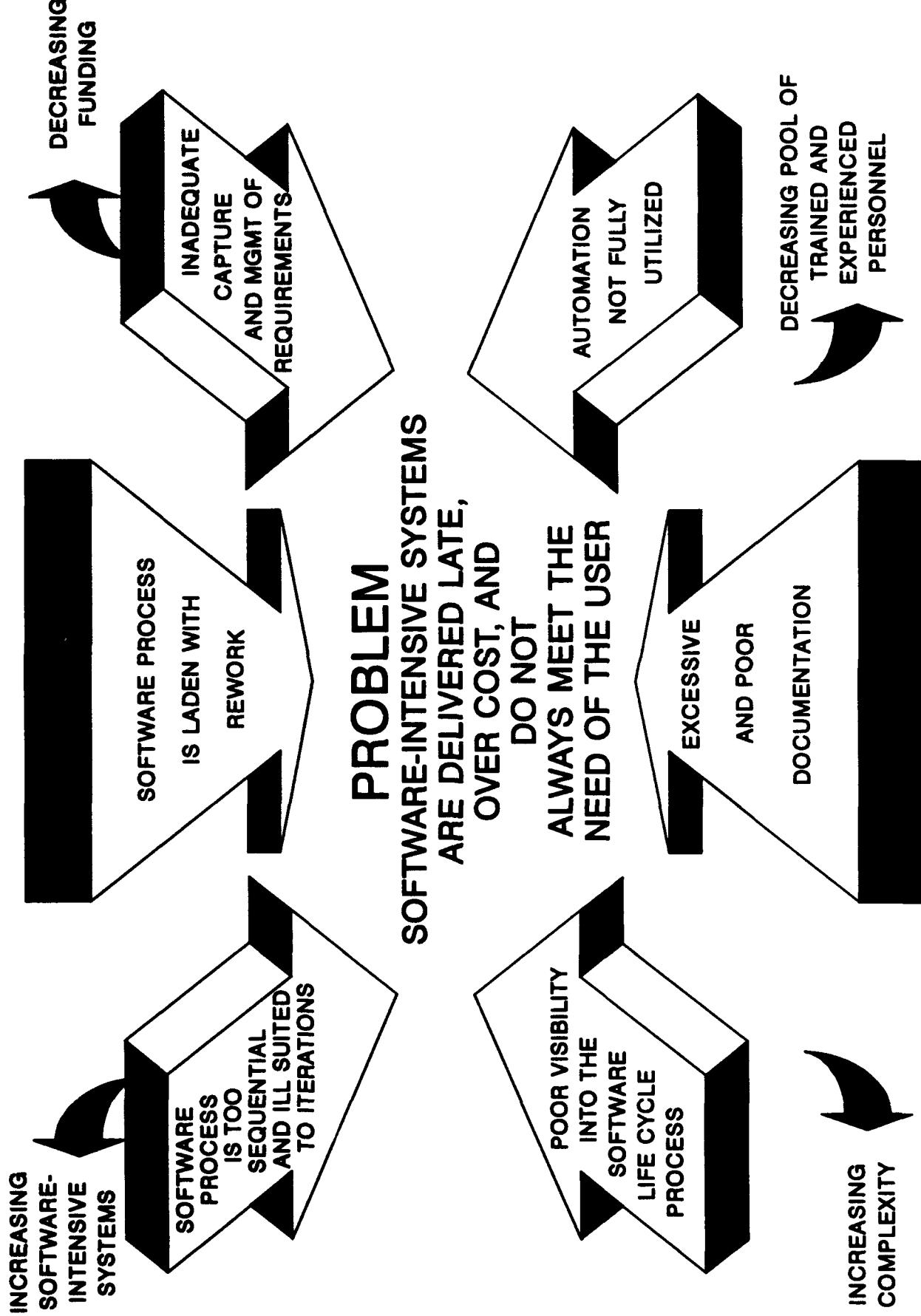
# APBI OVERVIEW



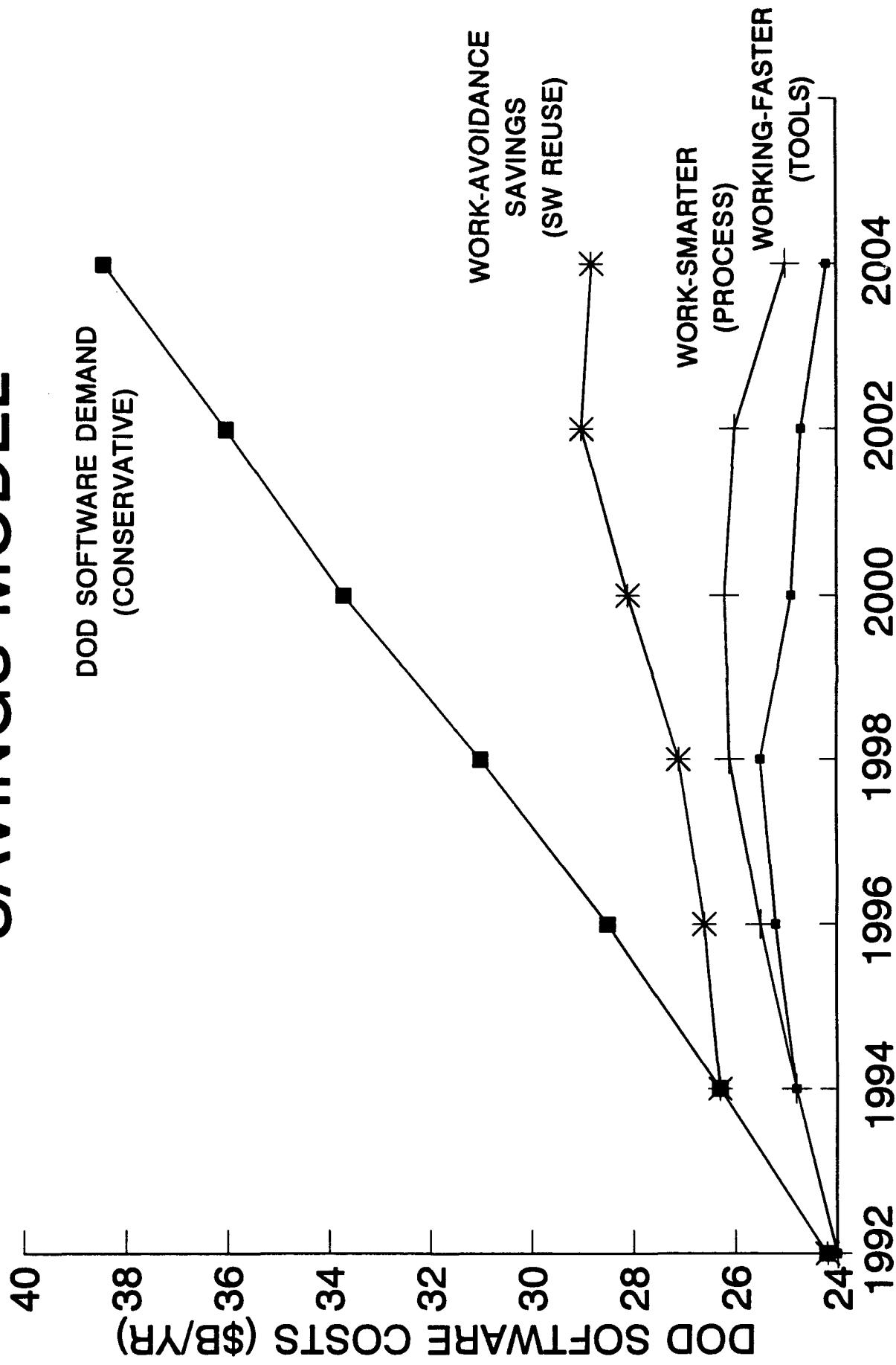
*Dennis J. Turner*

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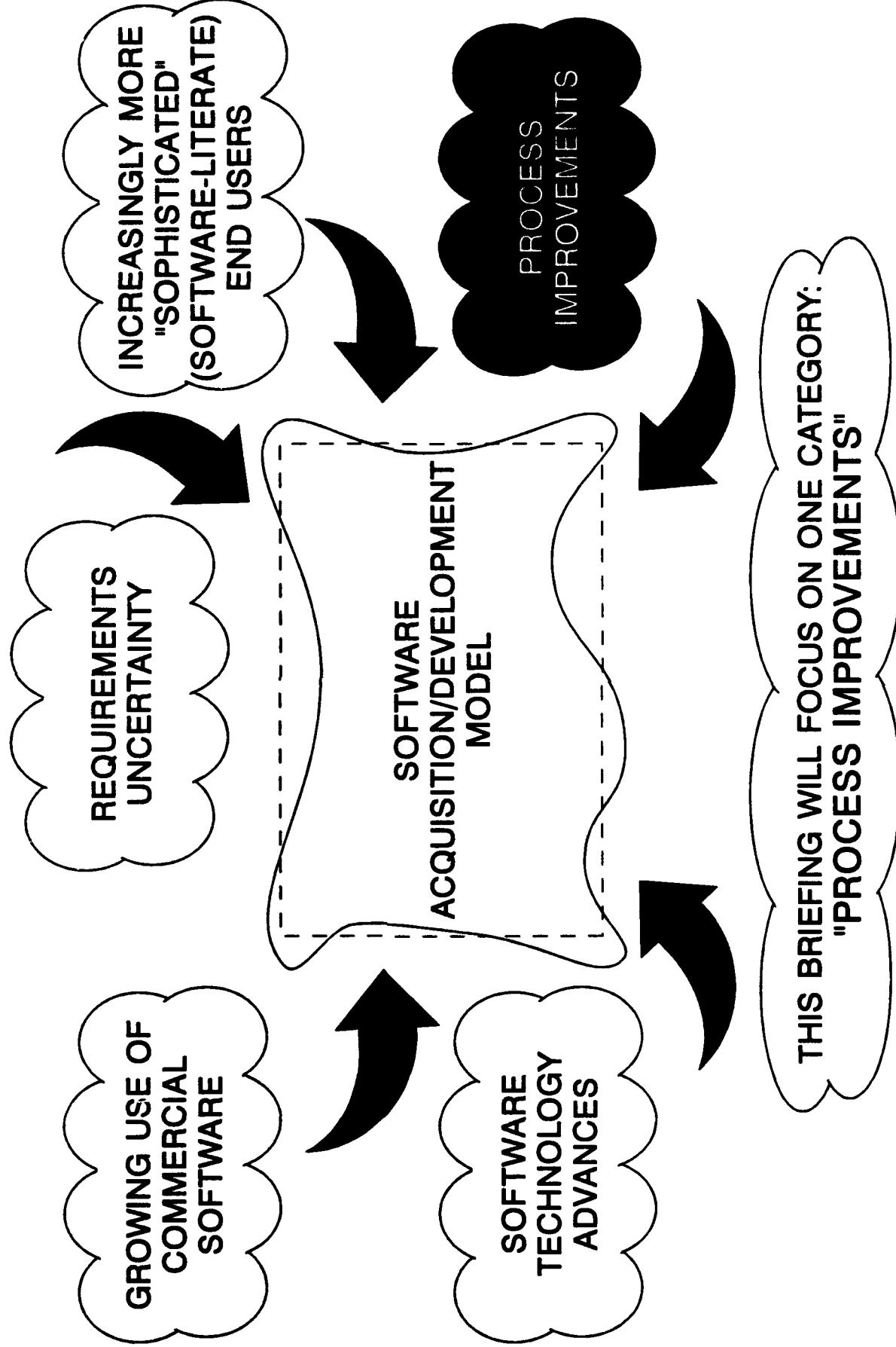
# SOFTWARE PROCESS CONCERNs



# SAVINGS MODEL



# OUR SOFTWARE CHALLENGES FALL INTO MANY CATEGORIES



# KEY PROCESS IMPROVEMENT THRUSTS

- EMPHASIZING "RISK" IDENTIFICATION AND ABATEMENT
- EMPHASIZING SOFTWARE "ARCHITECTURE"
- EMPHASIZING SOFTWARE PROCESS MATURITY
- STREAMLINING SOFTWARE DOCUMENTATION
- REWARDS FOR SUCCESSFUL PERFORMANCE

## UNDERLYING THEMES:

- ABANDON OLD PRACTICES THAT DON'T MAKE SENSE
- ADOPT NEW PRACTICES THAT DO MAKE SENSE
- FOCUS ON "RISK"

# EMPHASIZING RISK IDENTIFICATION AND ABATEMENT

- MOTIVATION:
  - EXPERIENCE HAS SHOWN THAT MOST OF OUR "HORROR STORIES" COULD HAVE BEEN AVOIDED HAD MORE EFFECTIVE RISK MANAGEMENT BEEN EMPLOYED
  - CONSERVATION OF (SCARCE) RESOURCES SUGGESTS AN EMPHASIS OF "RISK AREAS" NOT "SAFE ZONES"
- SOLUTION:
  - IN SOURCE SELECTION:
    - ASK OFFERORS TO IDENTIFY RISKS (PRODUCT AND PROCESS) AND THEIR PLANS TO MANAGE THEM
    - EVALUATE PROPOSALS BASED ON THE THOROUGHNESS AND INTEGRITY OF THE INFORMATION PROVIDED
    - TAKE INTO ACCOUNT IN THE SOURCE SELECTION DECISION
    - INCLUDE RISK ABATEMENT PLAN IN THE RESULTANT CONTRACT
  - IN CONTRACT MANAGEMENT:
    - PROVIDE FINANCIAL REWARD FOR SUCCESSFUL RISK ABATEMENT

WE WILL INCREASE OUR EMPHASIS ON RISK MANAGEMENT AND REWARD SUCCESSFUL RISK MITIGATION

# EMPHASIZING SOFTWARE ARCHITECTURE

## PROBLEM:

- TOO MANY ACQUISITIONS DON'T EMPHASIZE
  - REUSE
    - CAPITALIZING ON EXISTING (GOVERNMENT AND COTS) SOFTWARE ("IMPORTING" SOFTWARE)
    - DEVELOPING NEW SOFTWARE WITH THE NEEDS OF FUTURE SYSTEMS IN MIND ("EXPORTING" SOFTWARE)
  - THE NEED FOR EVOLUTION (OVER A LONG PERIOD OF TIME)

**ARCHITECTURE IS THE KEY IN BOTH AREAS**

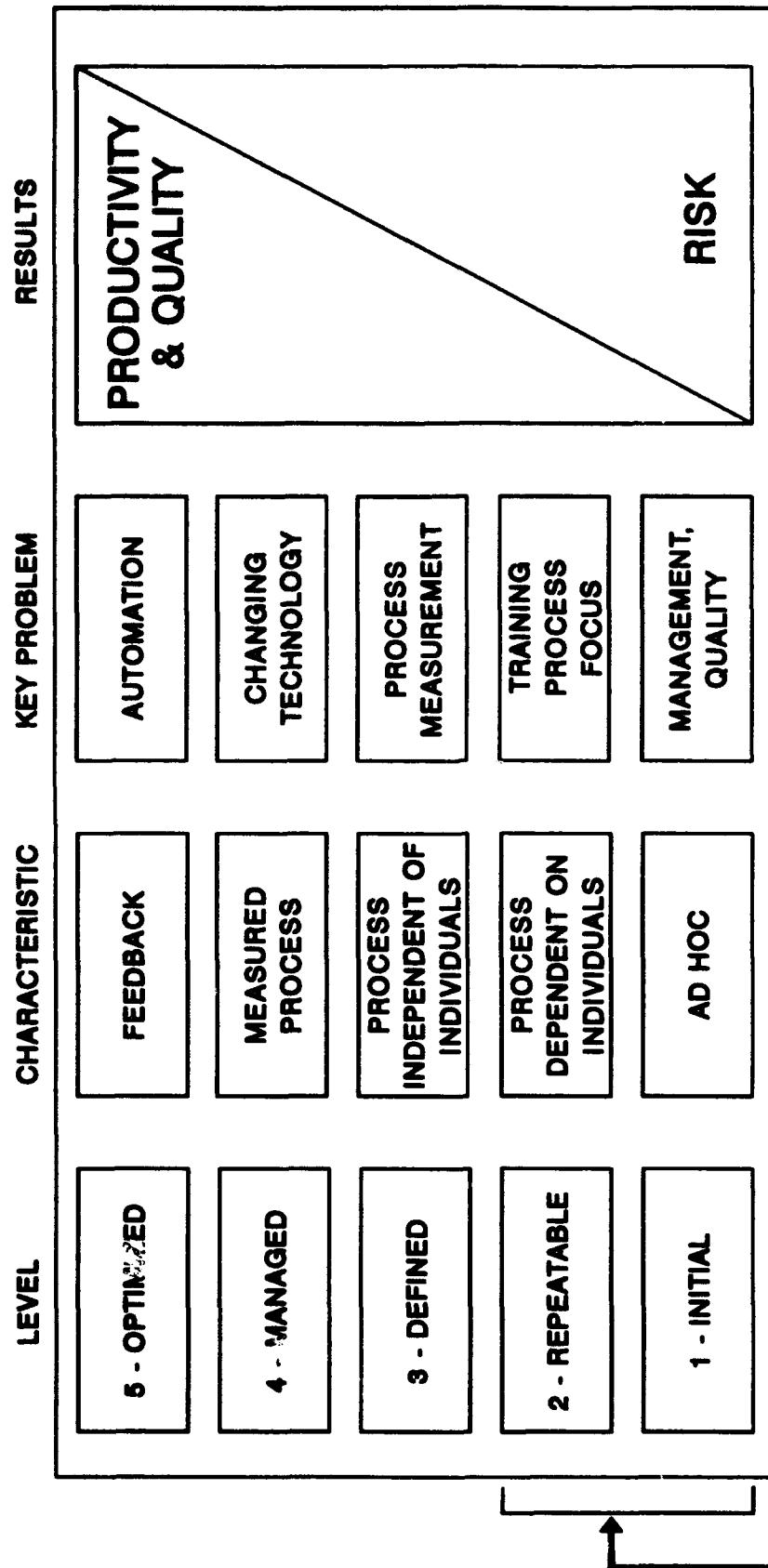
# EMPHASIZING SOFTWARE ARCHITECTURE (Continued)

## SOLUTION:

- CONDUCT A DOMAIN ANALYSIS IN EACH OF OUR PRINCIPAL BUSINESS AREAS AND DEFINE ARCHITECTURES THAT MEET THEIR NEEDS (PRESENT AND FUTURE)
- EMPHASIZE SOFTWARE ARCHITECTURE IN SOURCE SELECTION AND CONSIDER THE EXTENT TO WHICH PROPOSED APPROACHES ACCOMMODATE OUR CONCERN FOR REUSE AND EVOLUTION
- EMPHASIZE ARCHITECTURAL IMPACTS/ISSUES AS REQUIREMENTS CHANGE (DURING INITIAL ACQUISITION, DURING PDSS)

AS IN ANY TECHNICAL ENDEAVOR, IF THE ARCHITECTURE ISN'T RIGHT, SIGNIFICANT PROBLEMS WILL EMERGE

# EMPHASIZING SOFTWARE PROCESS MATURITY (SEI FRAMEWORK)



THE  
DEFENSE INDUSTRY  
IS HERE

# EMPHASIZING SOFTWARE PROCESS MATURITY

- IN SOURCE SELECTION:
  - EVALUATE PROCESS MATURITY OF OFFERORS
  - TIE PROCESS RISK EVALUATION TO SOURCE SELECTION DECISION
- DURING CONTRACT EXECUTION:
  - MONITOR IMPLEMENTATION OF RISK ABATEMENT PLANS
  - REWARD SUCCESSFUL RISK MITIGATION

**INDUSTRY MUST UNDERSTAND THAT PROCESS MATURITY AND PROCESS IMPROVEMENT ARE IMPORTANT TO US!**

# EMPHASIZING SOFTWARE PROCESSES MATURITY (Continued)

- WITHIN GOVERNMENT ORGANIZATIONS:
  - ESTABLISH MATURITY BASELINE (THROUGH SELF-ASSESSMENT)
  - INITIATE AGGRESSIVE IMPROVEMENT PLAN

**GOVERNMENT ORGANIZATIONS NEED  
TO IMPROVE THEIR PROCESSES TOO**

# STREAMLINING SOFTWARE DOCUMENTATION

- OBJECTIVE:
  - ELIMINATE UNNECESSARY COST, TIME
  - IMPROVE QUALITY, SUBSTANCE
- APPROACH:
  - APPLY CORPORATE EXPERIENCE AND COMMON SENSE TESTS TO DOCUMENTATION REQUIREMENTS DECISIONS
  - ENCOURAGE INDUSTRY TO PROPOSE THEIR INTERNAL DOCUMENTATION METHODS WHENEVER POSSIBLE
  - EMPLOY MACHINE-READABLE DOCUMENTATION
  - REVIEW IN "REAL TIME" (NOT AFTER THE FACT)
  - EMPLOY SKILLED REVIEW TEAMS:
    - ON-LINE
    - IN-PLANT

**SIGNIFICANT OPPORTUNITIES  
FOR COST REDUCTION**

# REWARDING SUCCESSFUL PERFORMANCE CONTRACT TYPES

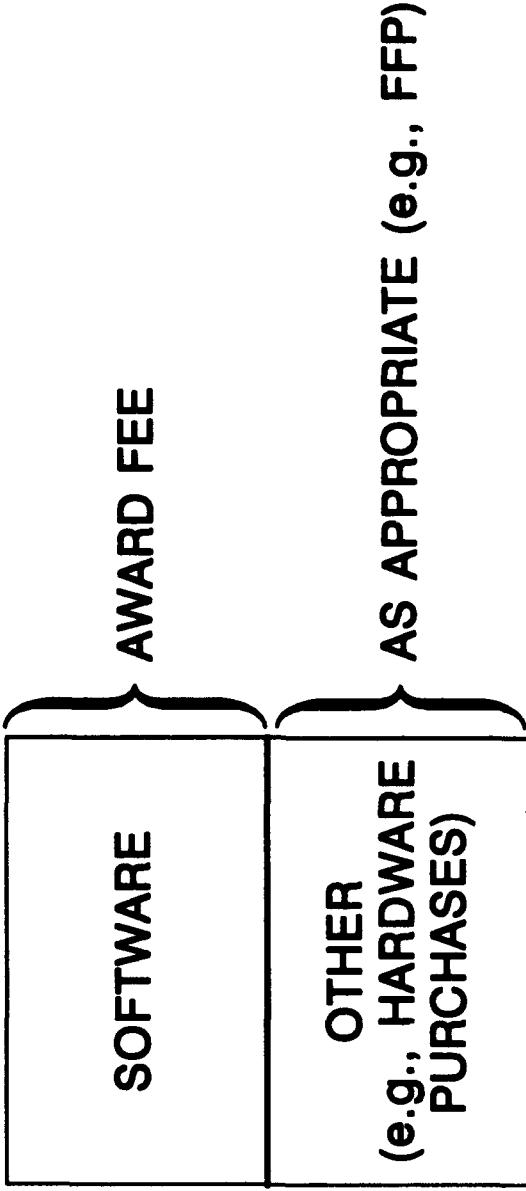
- MANY CONTRACT TYPES ARE AVAILABLE AND HAVE BEEN USED FOR SOFTWARE
- EXPERIENCE HAS LED US TO CONCLUDE THAT "AWARD FEE" VEHICLES ARE THE MOST EFFECTIVE

AWARD FEE CONTRACTS PROVIDE THE REWARD FOUNDATION THAT ENABLES US TO ENSURE THAT ARMY INTERESTS ARE BEING SATISFIED

# HYBRID CONTRACTS

- IN SITUATIONS WHERE WE NEED A CONTRACT FOR SOFTWARE DEVELOPMENT AND OTHER PRODUCTS/SERVICES, A "HYBRID" CONTRACT TYPE MAY HAVE CONSIDERABLE MERIT:

CONTRACT



**EXPECT TO SEE HYBRID CONTRACTS  
(WHEN SITUATIONS WARRANT THEM)**

# SUMMARY

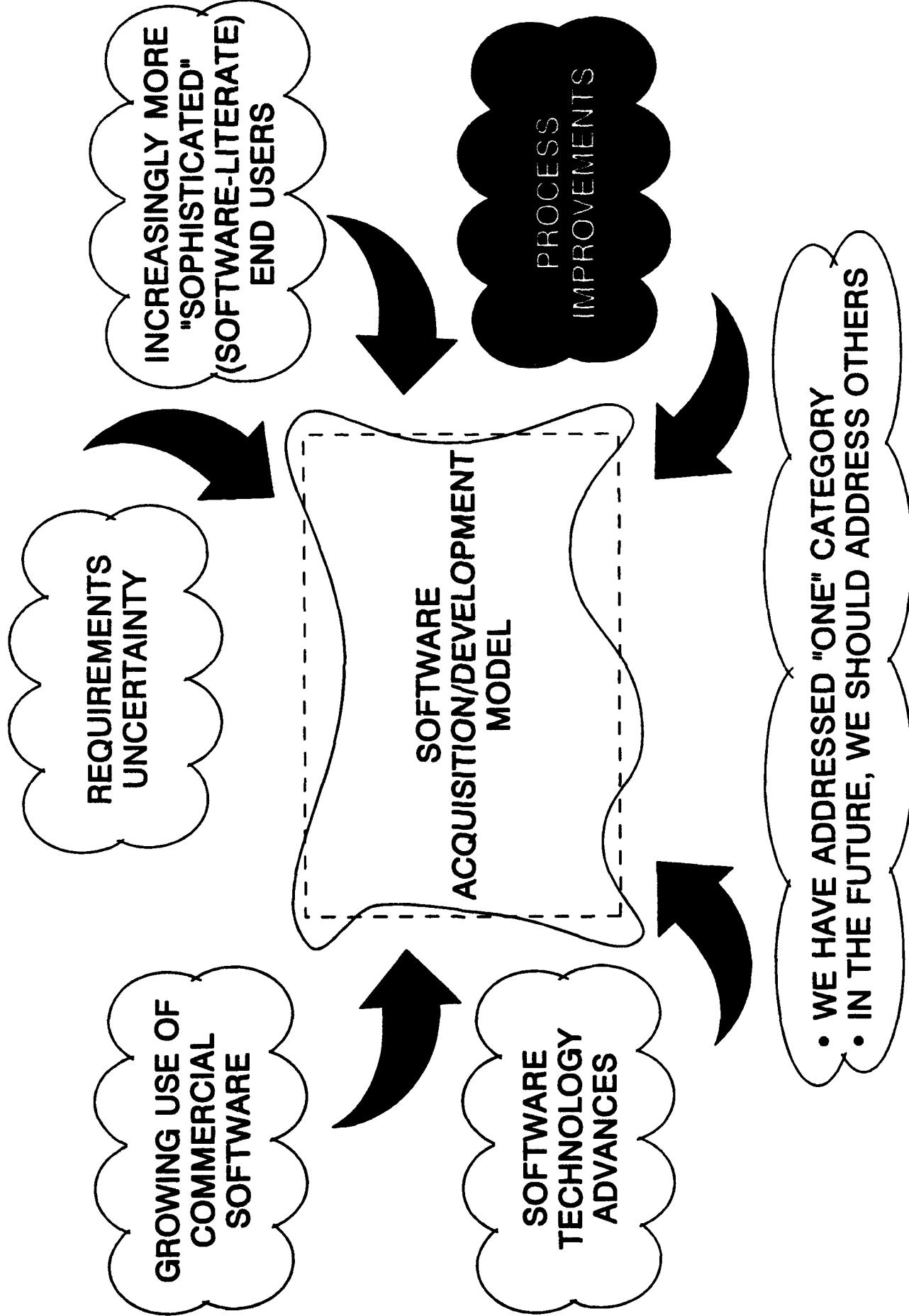
## WE NEED TO EMPHASIZE:

- RISK IDENTIFICATION/ABATEMENT
- SOFTWARE ARCHITECTURE
- PROCESS MATURITY
- DOCUMENTATION STREAMLINING
- REWARDS FOR SUCCESSFUL PERFORMANCE

### IMPLICATIONS:

- MORE UP-FRONT ENGAGEMENT
- DISCIPLINED, FLEXIBLE INTERACTIONS THROUGHOUT SOURCE-SELECTION, CONTRACT EXECUTION

# RECALLING THE BIGGER PICTURE



# **NOTES**

# **SESSION 1**

## **SOFTWARE STANDARDS AND TECHNIQUES**



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# **SESSION 1**

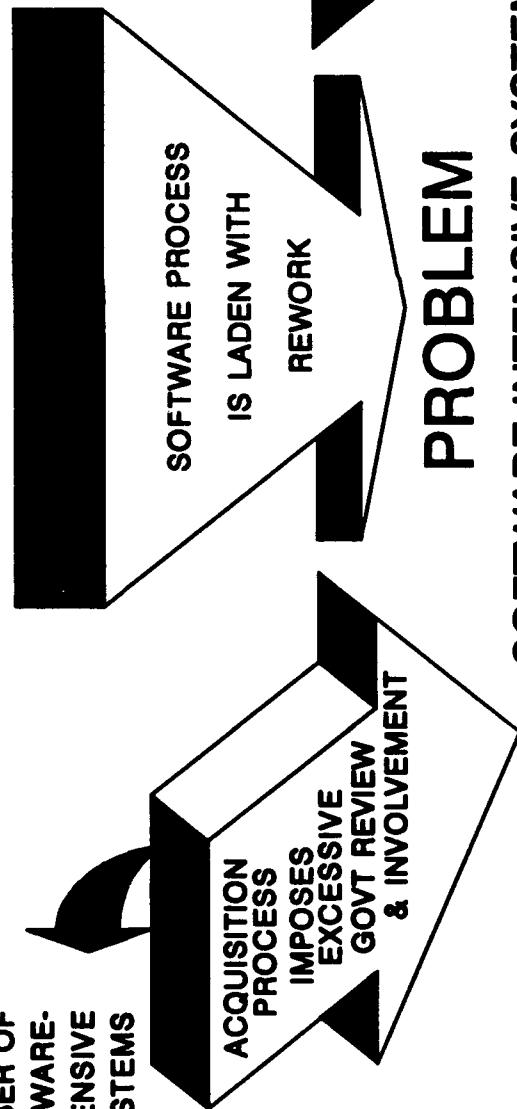
## **OVERVIEW AND INTRODUCTION**

***MODERATOR***  
***JOHN T. LEBARON***

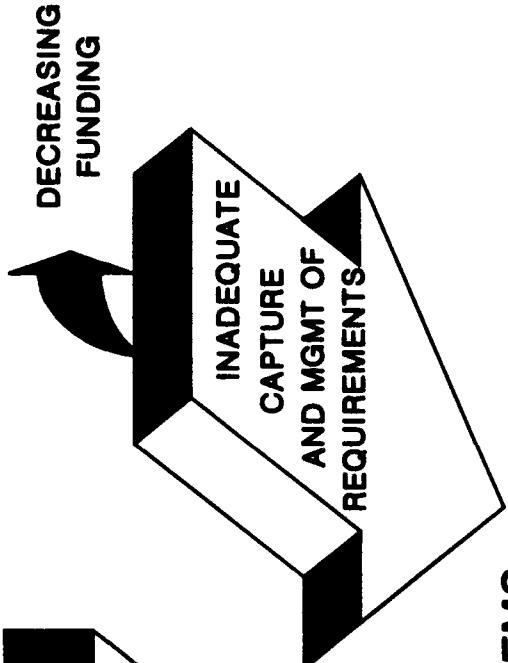
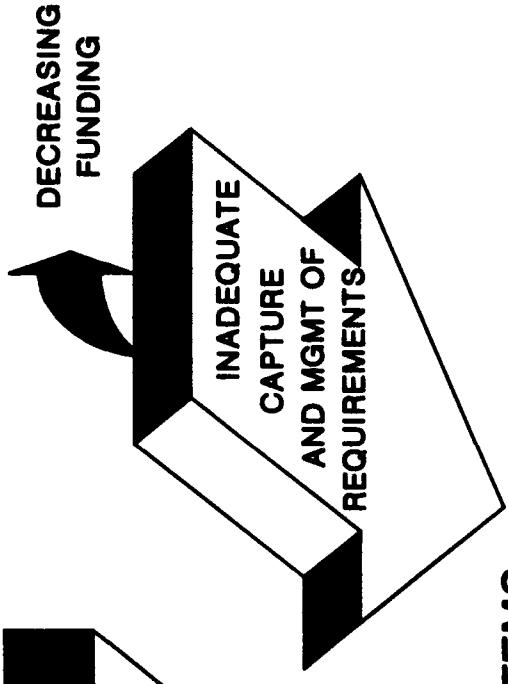
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# SOFTWARE ACQUISITION CONCERNS

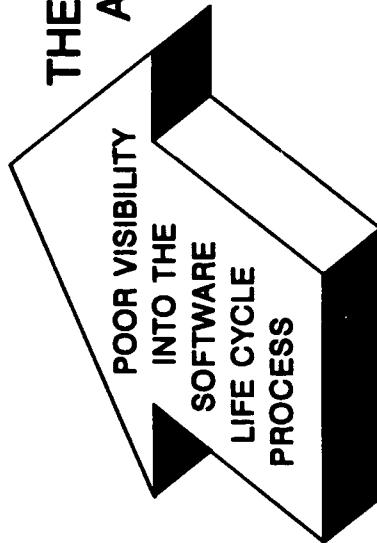
INCREASING NUMBER OF SOFTWARE-INTENSIVE SYSTEMS



SOFTWARE PROCESS IS LANDED WITH REWORK



SOFTWARE-INTENSIVE SYSTEMS ARE DELIVERED LATE, OVER COST, DO NOT ALWAYS MEET THE NEEDS OF THE USER, AND ARE DIFFICULT & COSTLY TO MAINTAIN



EXCESSIVE AND POOR DOCUMENTATION

DECREASING POOL OF TRAINED AND EXPERIENCED PERSONNEL

INCREASING COMPLEXITY

# SOFTWARE STANDARDS AND TECHNIQUES

SOFTWARE DEVELOPMENT &  
DOCUMENTATION STANDARDS

MIL-STD-2167A  
DOES NOT

MIL-STD-SDD  
DOES

ISSUES

- ALLOW FOR THE USE OF CASE TECHNOLOGY
- RESTRICTION OF DOCUMENTATION
- PROVIDE INSIGHT INTO SOFTWARE DEVELOPMENT EFFORTS
- PROVIDE FOR NON-SEQUENTIAL OR ITERATIVE SOFTWARE DEVELOPMENT PROCESSES

# SOFTWARE STANDARDS AND TECHNIQUES

SIMULATION  
& MODELING

SOFTWARE  
ARCHITECTURE  
& REUSE

DISTRIBUTED  
INTERACTIVE  
SIMULATIONS

STARS  
DEMONSTRATION  
PROGRAM

ISSUES

SOFTWARE PROCESS IS LADEN WITH REWORK  
INABILITY TO CAPTURE AND MANAGE REQUIREMENTS

**TO FURTHER INQUIRE  
CONTACT:  
JOHN T. LEBARON**

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FORT MONMOUTH, NJ 07703-5000  
(908) 532-1803**

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# **NOTES**

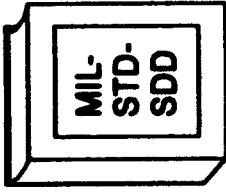
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# **SOFTWARE DEVELOPMENT DOCUMENTATION (SDD) AND ITS IMPACT ON FUTURE ACQUISITIONS**



*Jeffrey Herman*

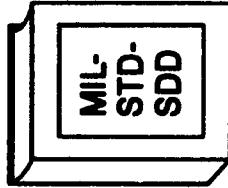
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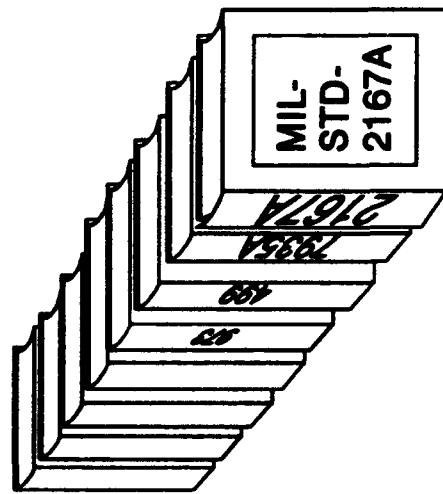
# MIL-STD-SDD

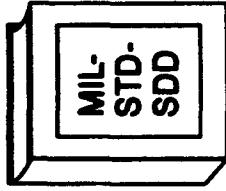
- BACKGROUND/RATIONALE FOR CURRENT INITIATIVE
- SDD EMPHASIS
- IMPACT ON SED AND ARMY ACQUISITION PRACTICES

# BACKGROUND



THE PROLIFERATION OF SOFTWARE STANDARDS RESULTED IN A RIGID SOFTWARE DEVELOPMENT PROCESS



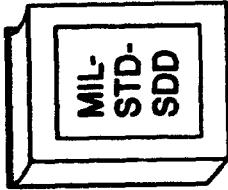


# BACKGROUND

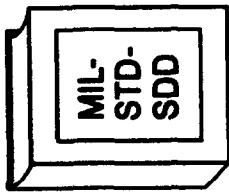
## RATIONALE FOR NEW STANDARD

- HARMONIZATION OF DOD-STD-2167A AND DOD-STD-7935A ACHIEVED THROUGH:
  - DIRECT USER FEEDBACK
  - INDUSTRY ASSOCIATIONS
  - GOVERNMENT/INDUSTRY WORKSHOPS
  - DoD PROCESS ACTION TEAMS
  - ADDITIONAL ANALYSIS

# SDD EMPHASIS



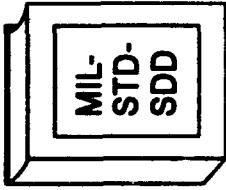
- DOCUMENTATION
- SOFTWARE PROCESS/ALTERNATE LIFE CYCLES
- SOFTWARE COMPONENT STRUCTURE
- SUPPORTABILITY
- REUSE
- METRICS



## SDD EMPHASIS DOCUMENTATION

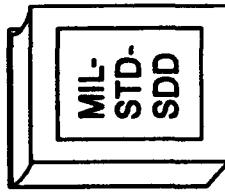
- EMPHASIS SHIFTED FROM CREATION OF DOCUMENTS TO IMPROVING PERFORMANCE
- ALLOWS USE OF AS-BUILT INFORMATION
- PROVIDES GUIDANCE TO REDUCE DOCUMENTATION DELIVERABLES

## SDD EMPHASIS



## SW PROCESS/ALTERNATIVE LIFE CYCLES

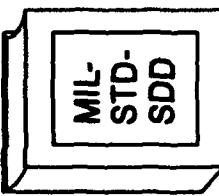
- FLEXIBLE TO PERMIT ALTERNATIVE SOFTWARE PROCESSES
- CONTRACTOR DEFINES THE PROCESS WITHIN SDD FRAMEWORK
- GUIDANCE PROVIDED FOR INCREMENTAL AND EVOLUTIONARY DEVELOPMENT



## SDD EMPHASIS

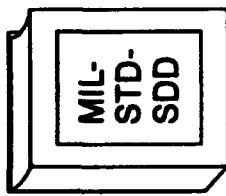
## SOFTWARE COMPONENT STRUCTURE

- HIERARCHICAL STRUCTURE ELIMINATED
- PROVIDES FLEXIBILITY TO ACCOMMODATE OTHER STRUCTURES
- TESTING APPROACH ASSOCIATED WITH CHOSEN SOFTWARE STRUCTURE



## SDD EMPHASIS SUPPORTABILITY

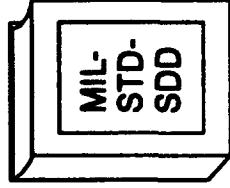
- CAPTURE OF ADDITIONAL INFORMATION  
  SUCH AS RATIONALES
- USE OF REVIEWABLE AND DELIVERABLE  
  WORK PRODUCTS
- REQUEST IDENTIFICATION OF RISK  
  ASSOCIATED WITH SUPPORTABILITY



# SDD EMPHASIS

## REUSE

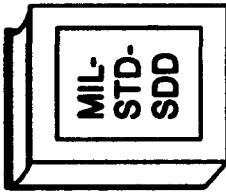
- EMPHASIS ON INCORPORATING REUSABLE SOFTWARE
- DETAILED CRITERIA PROVIDED FOR EVALUATION OF REUSABLE SOFTWARE
- GUIDANCE PROVIDED FOR TAILORING SDD PRODUCTS WHEN INCLUDING REUSABLE SOFTWARE



# SDD EMPHASIS METRICS

- SUPPORTS USE OF SOFTWARE MANAGEMENT INDICATORS
- PROVIDES CANDIDATE LIST BUT DOES NOT MANDATE ITS USE

# SUMMARY



- SSD IS COMING (EARLY 1994)
- MORE RELIANCE ON USE OF CONTRACTOR PROCESSES AND TOOLS
- REDUCED DOCUMENTATION
- DEPENDENCE ON RISK ABATEMENT

*TO FURTHER INQUIRE  
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FORT MONMOUTH, NJ 07703-5000  
(908) 532-8071*

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# **NOTES**

# SOFTWARE MODELING AND SIMULATION



MAJ Gordon W. Robson

UNCLASSIFIED

# PURPOSE

- PROVIDE INFORMATION ON OUR SOFTWARE NEEDS FOR MODELING AND SIMULATIONS TO INCLUDE FUTURE BUSINESS PRACTICES

# SOFTWARE BUSINESS PRACTICE CHANGES

- SIMULATIONS AND MODELS HAVE BECOME THE ACQUISITION PREFERENCE FOR THE FUTURE
- A SIMULATION AND MODELING PLAN WILL BE REQUIRED FOR ALL NEW TACTICAL SYSTEMS AND ADVANCED TECHNOLOGY DEMONSTRATIONS (TIED TO DODD 5000 SERIES)
- SOFTWARE TECHNOLOGIES ARE NEEDED FOR BOTH SIMULATION AND TACTICAL SYSTEMS
- DISTRIBUTED INTERACTIVE SIMULATION (DIS) ESTABLISHES STANDARDS AND PROTOCOLS FOR FUTURE DoD NEEDS

## INDUSTRY MUST:

- BUILD/RETAIN SIMULATION & MODELING EXPERTISE
- ADDRESS SIMULATION & MODELING IN PROPOSALS

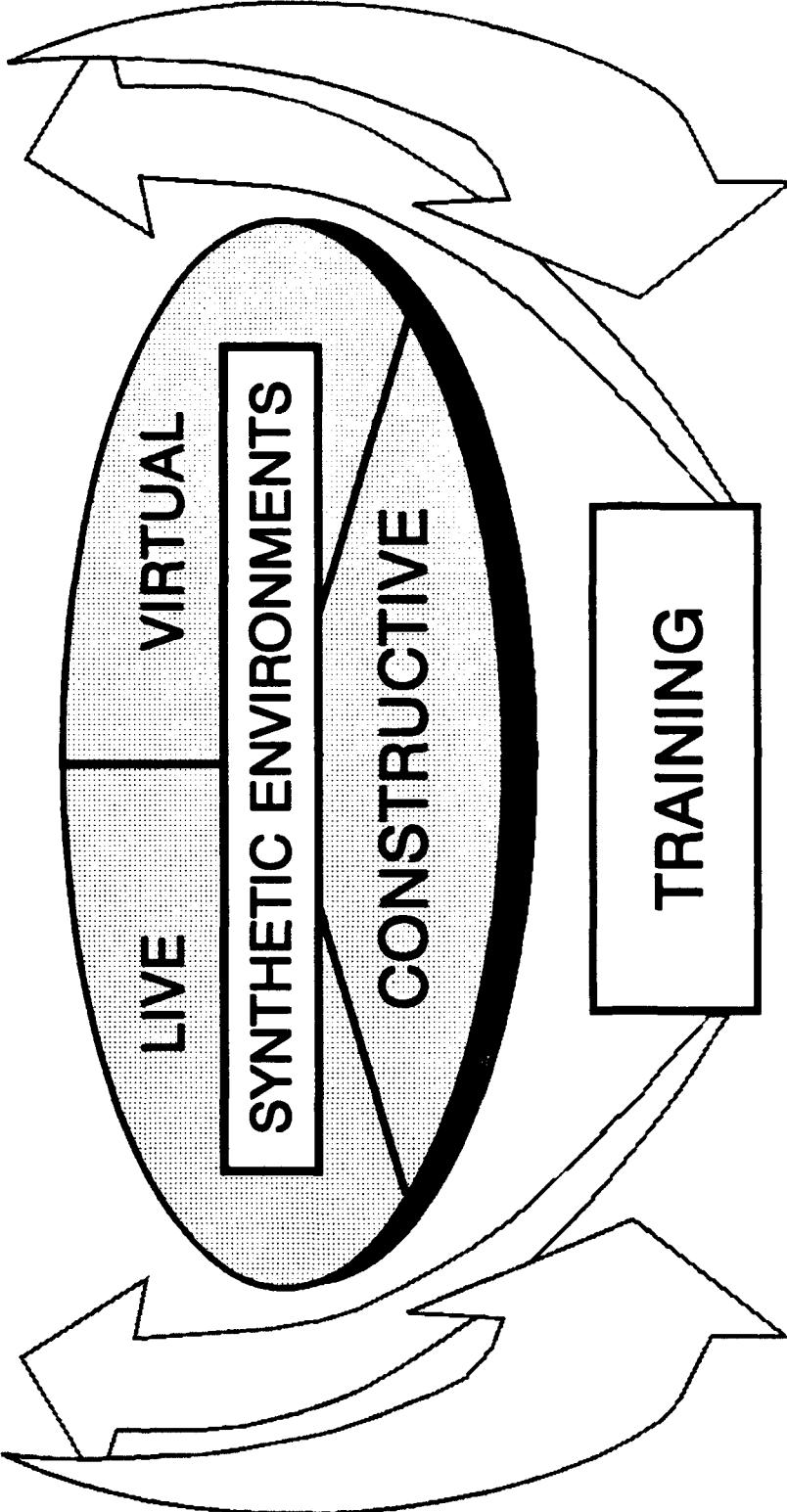
# DISTRIBUTED INTERACTIVE SIMULATIONS (DIS)

## THE FUTURE

**DIS DOMAINS**

**RES, DEV, & ACQ  
(RDA) PROCESS**

**MILITARY  
OPERATIONS**



# **CECOM RDEC SED SUPPORT TO STRICOM**

## **LIFE CYCLE SOFTWARE ENGINEERING**

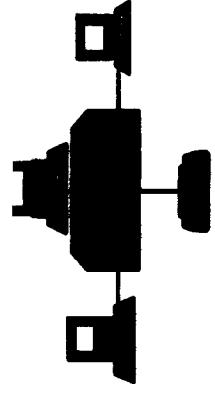
- TECHNICAL SUPPORT FOR:
  - REQUIREMENTS SPECIFICATIONS
  - REQUEST FOR PROPOSAL
  - SOURCE SELECTION
- INDEPENDENT VALIDATION AND VERIFICATION
- PROGRAM SUPPORT TO PMs:
- COMPUTER RESOURCES LIFE CYCLE MANAGEMENT PLAN (CRLCMP)
- TEST AND EVALUATION MASTER PLAN (TEMP)
- INTEGRATED LOGISTICS SUPPORT PLAN (ILSP)
- PROGRAM REVIEWS
- POST DEPLOYMENT SOFTWARE SUPPORT

STRICOM

SYSTEMS

UNDER

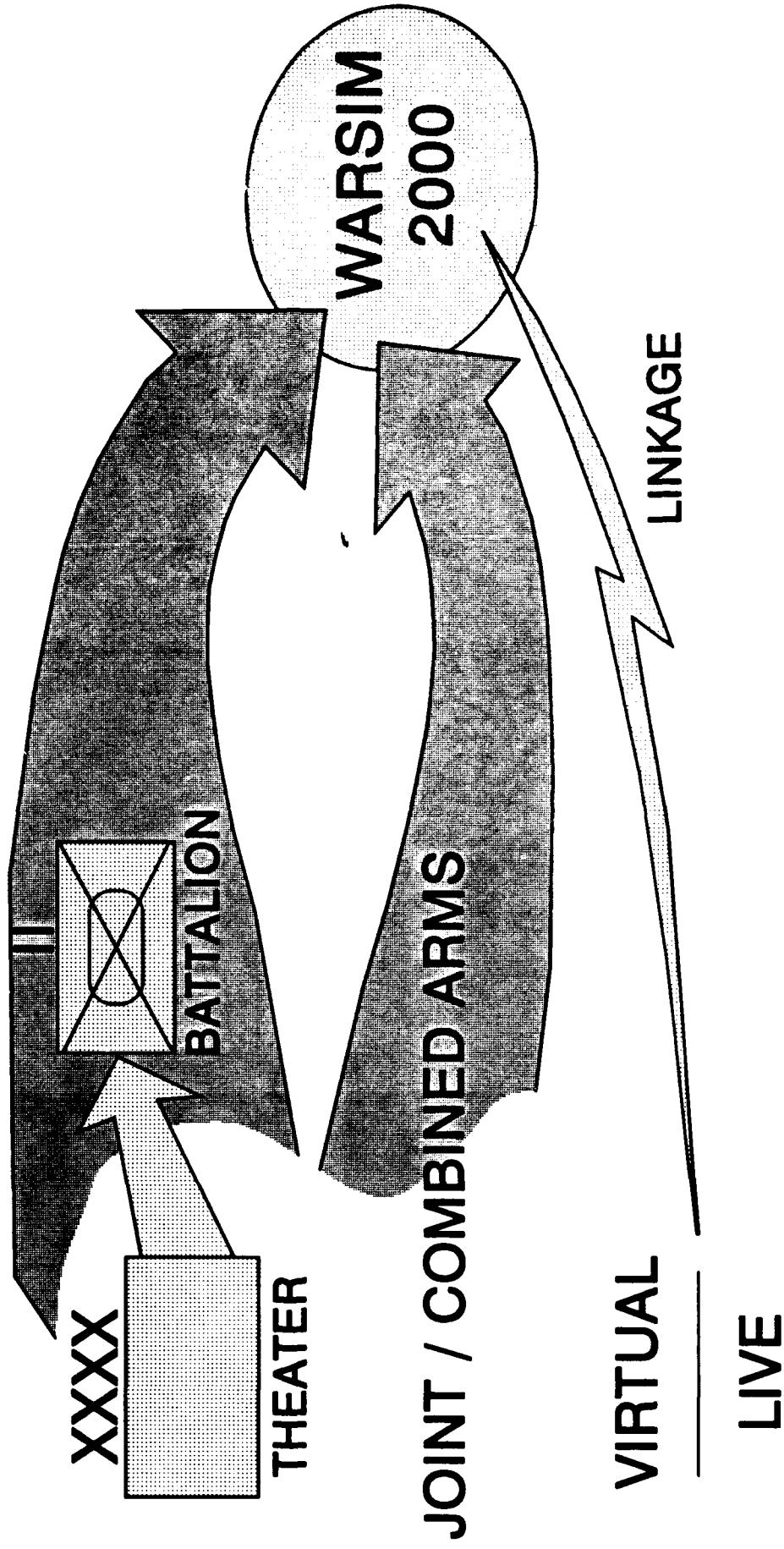
DEVELOPMENT



VIRTUAL

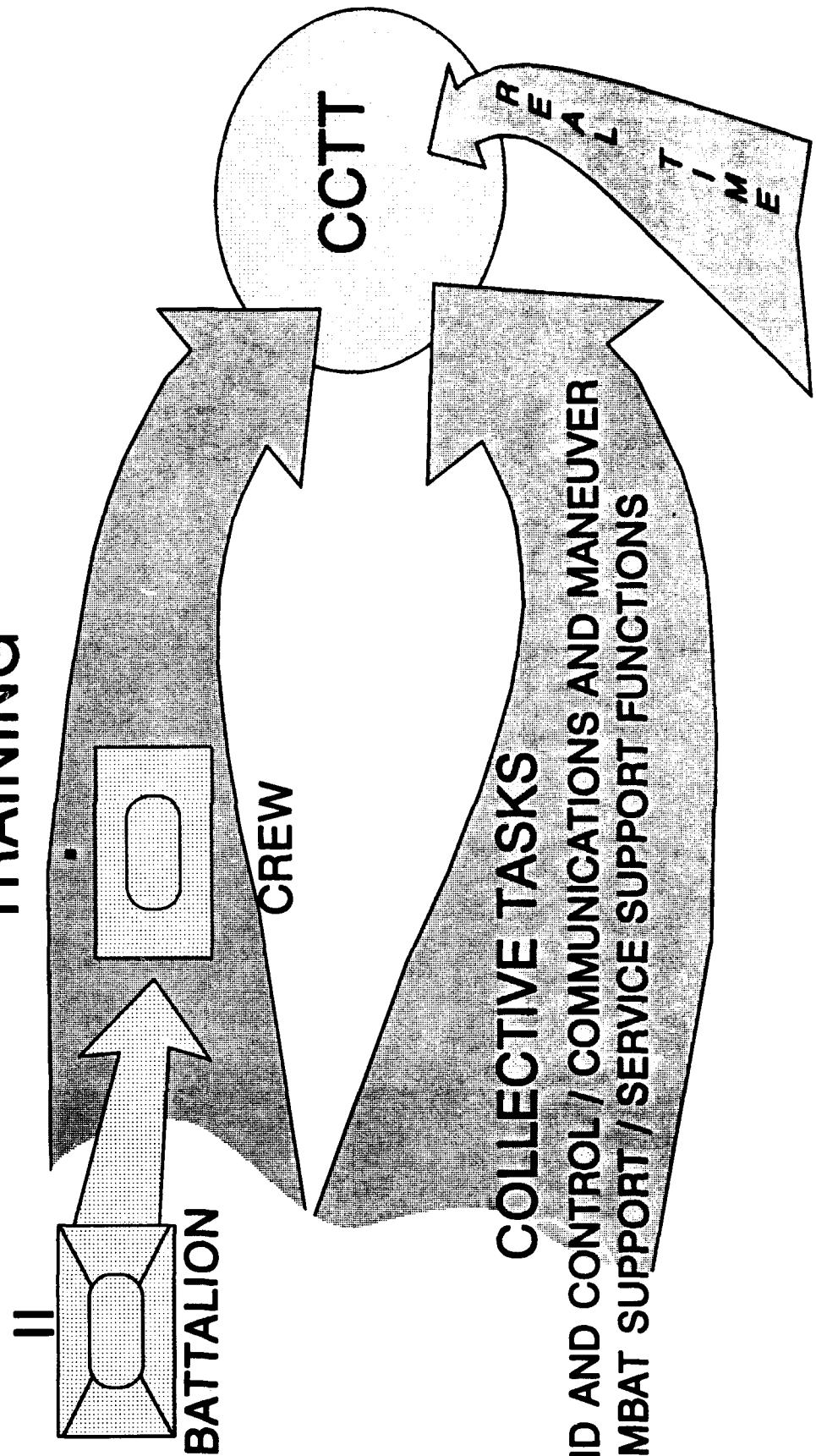
WARSIM 2000

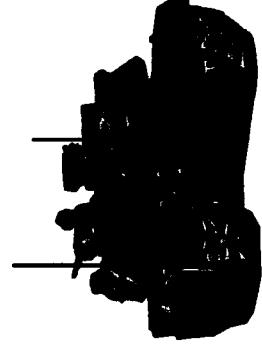
## SUPPORTS COMMAND AND STAFF TRAINING



**VIRTUAL  
CLOSE COMBAT TACTICAL TRAINER  
(CCTT)**

**SUPPORTS INDIVIDUAL CREW AND SMALL UNIT  
TRAINING**





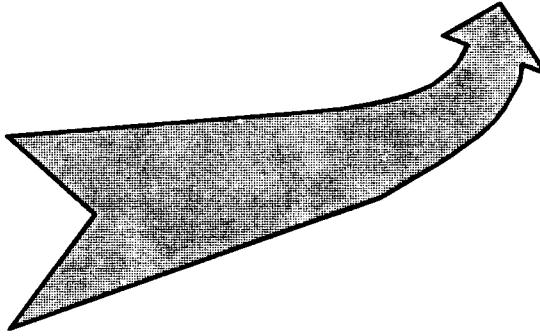
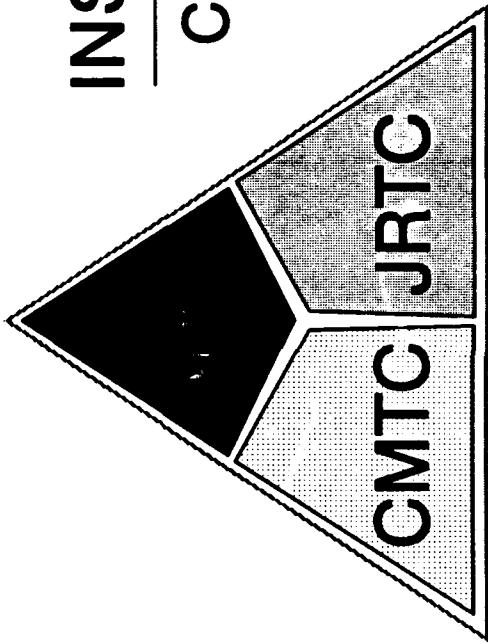
LIVE

## COMBAT TRAINING CENTER INSTRUMENTATION SYSTEMS

SUPPORTS SMALL UNIT THROUGH BRIGADE  
LEVEL TRAINING

### FORCE ON FORCE

INSTRUMENTATION  
COLLECTS DATA OF  
ACTUAL PLAY

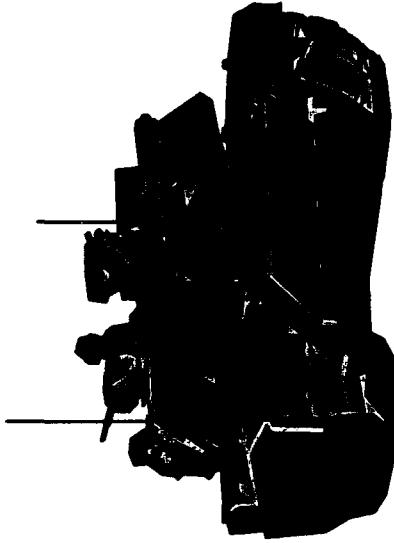


AFTER ACTION REVIEW  
TAKE HOME PACKAGE

# SOFTWARE TECHNOLOGIES

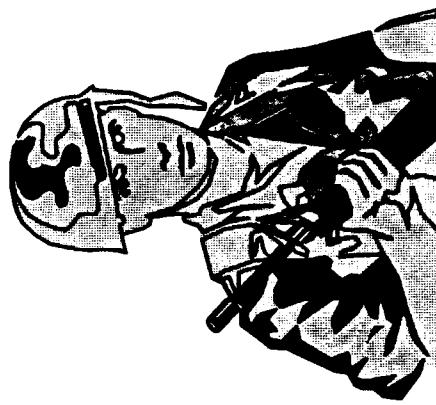
## LIVE

INTEGRATED  
SELECTIVE  
SENSING  
SELF-CONFIGURING  
ROLE PLAYING



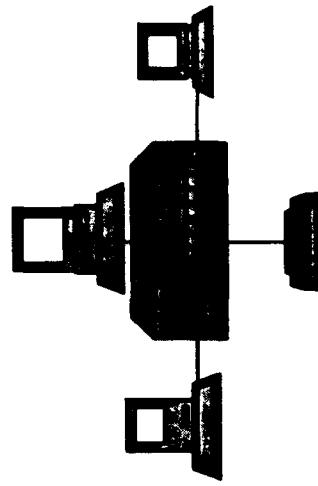
## VIRTUAL

STANDARD INTERFACES  
DYNAMIC TERRAIN  
SEMI-AUTOMATED FORCES  
SIMULATION CORRELATION



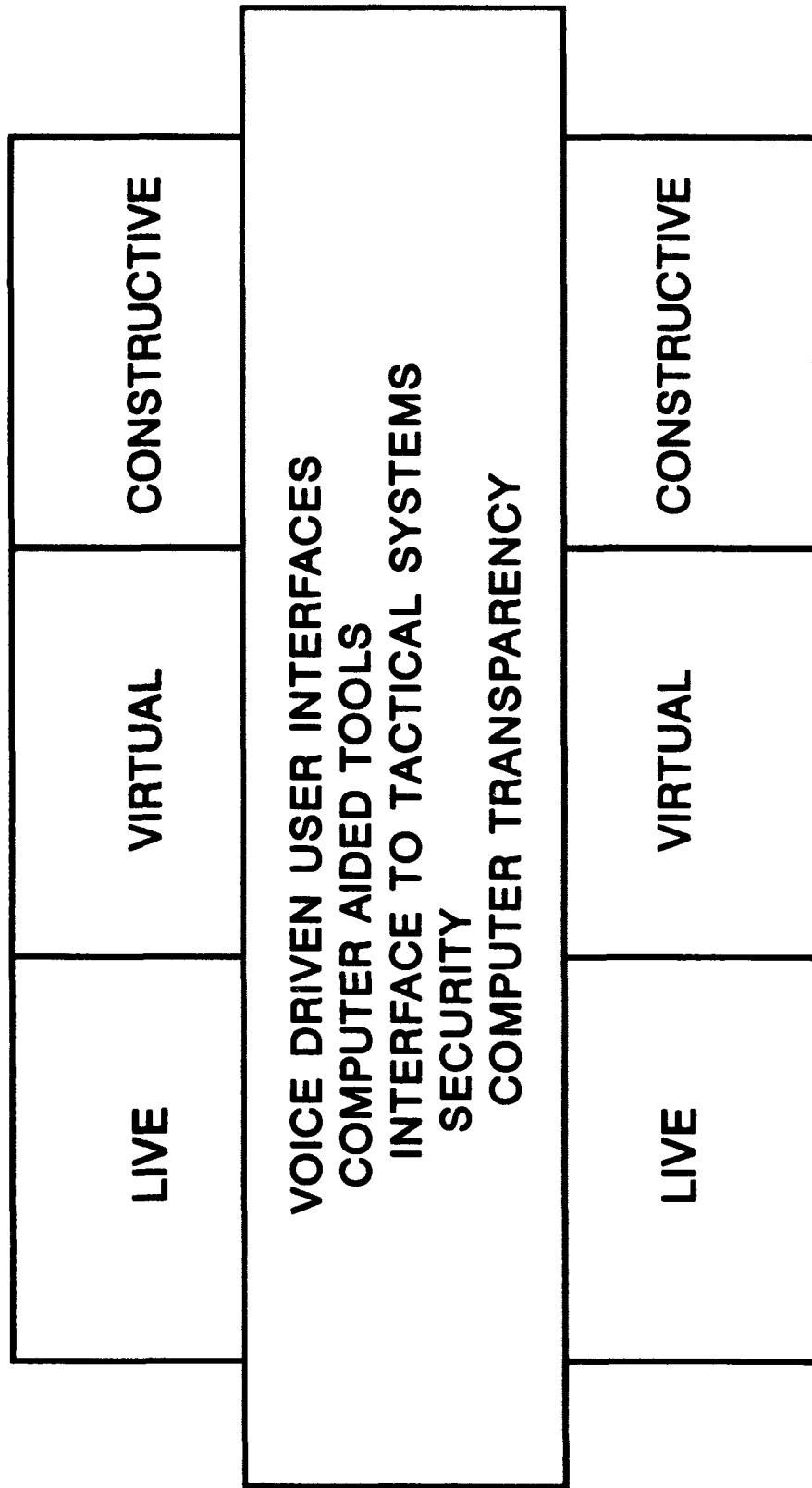
## CONSTRUCTIVE

SEMI-AUTOMATED  
FORCES  
INTERACTIVE TERRAIN  
EFFECTIVE AFTER  
ACTION REVIEW  
LINKAGE-INTERFACE



# SOFTWARE TECHNOLOGIES

## COMMON NEEDS



# SUMMARY

- SIMULATIONS AND MODELS HAVE BECOME THE ACQUISITION PREFERENCE FOR THE FUTURE
- A SIMULATION AND MODELING PLAN WILL BE REQUIRED FOR ALL NEW TACTICAL SYSTEMS AND ADVANCED TECHNOLOGY DEMONSTRATIONS (TIED TO DODD 5000 SERIES)
- SOFTWARE TECHNOLOGIES ARE NEEDED FOR BOTH SIMULATION AND TACTICAL SYSTEMS
- DISTRIBUTED INTERACTIVE SIMULATION (DIS) ESTABLISHES STANDARDS AND PROTOCOLS FOR FUTURE DOD NEEDS

## INDUSTRY MUST:

- BUILD/RETAIN SIMULATION & MODELING EXPERTISE
- ADDRESS SIMULATION & MODELING IN PROPOSALS

# DISTRIBUTED INTERACTIVE SIMULATION

## POINTS OF CONTACT

**STRICOM:**  
(LEAD AGENCY)

LTC JAN DRABCZUK  
ACTING PM DIS  
(407) 381-8765  
CDR, STRICOM  
ATTN: AMSTI-DIS  
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ORLANDO, FL 32826-3276

**CECOM:**

JOHN SILIATO  
CHIEF, MODELING AND SIMULATION BRANCH  
(908) 544-4708  
CDR, CECOM  
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FORT MONMOUTH, NJ 07703-5203

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# **NOTES**

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# SOFTWARE ARCHITECTURES AND REUSE AND ITS IMPACT ON SOFTWARE DEVELOPMENT



*Gerald Brown*

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# SOFTWARE REUSE PROGRAM

TRANSFER OF ARPA's CONCEPTS OF  
MEGAPROGRAMMING IN CONJUNCTION  
WITH THE SOFTWARE TECHNOLOGY FOR  
ADAPTABLE RELIABLE SYSTEMS (STARS)  
CONCEPTUAL FRAMEWORK FOR REUSE  
PROCESS (CFRP)

THE CECOM RDEC SOFTWARE ENGINEERING  
DIRECTORATE (SED) SOFTWARE REUSE  
PROGRAM DEFINES A CONTEXT FOR  
INCORPORATING REUSE INTO THE SOFTWARE  
DEVELOPMENT AND MAINTENANCE PROCESSES

# SOFTWARE REUSE OBJECTIVES

- TO IDENTIFY AND ADAPT REUSE TECHNOLOGY TO ENHANCE PRODUCTIVITY FOR MISSION CRITICAL DEFENSE SYSTEMS (MCDSS)
- TO TRANSITION REUSE TECHNOLOGY TO PRACTICE
- TO IDENTIFY THE RISKS ASSOCIATED WITH ADOPTING REUSE TECHNOLOGY

# STRATEGIC REUSE

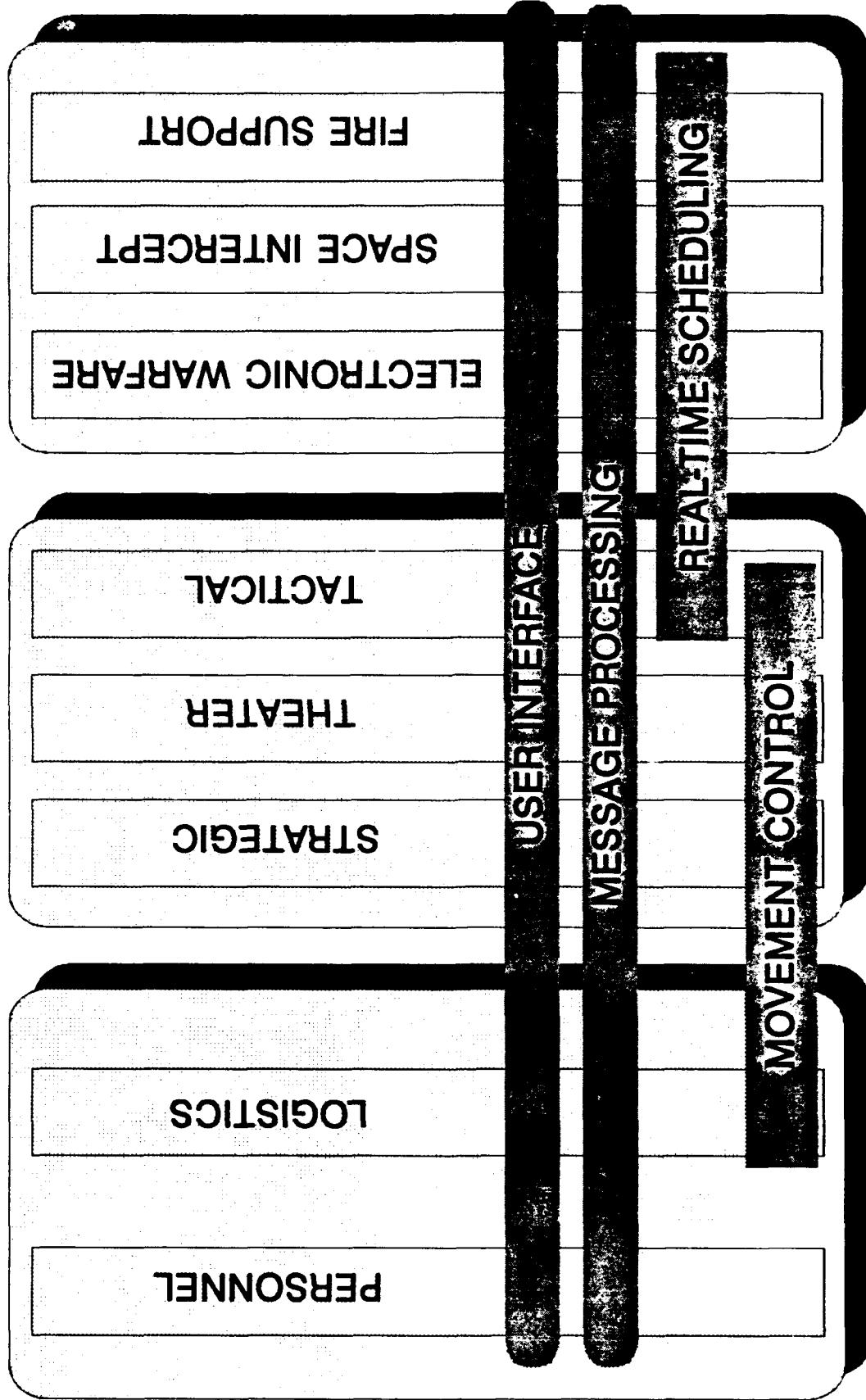
- CECOM TRANSITION TO STRATEGIC/SYSTEMATIC REUSE IS BASED ON:
  - DoD SOFTWARE REUSE VISION AND STRATEGY
  - ARMY STRATEGIC REUSE PLAN

# CECOM SED APPROACH TO STRATEGIC REUSE

- FOCUS ON REUSE WITHIN DOMAINS
- USE A PHASED APPROACH
- THE ARMY STARS DEMO PROJECT WILL PROVIDE THE ENABLING ELEMENTS OF SYSTEMATIC REUSE
- ENCOURAGE INVESTMENT (BOTH GOVERNMENT AND INDUSTRY) TO CREATE PROVEN COMPONENTS CONSISTENT WITH THE DoD APPROACH

# DOMAIN SPECIFIC APPROACH TO REUSE

INFORMATION SYSTEMS COMMAND AND CONTROL WEAPON SYSTEMS



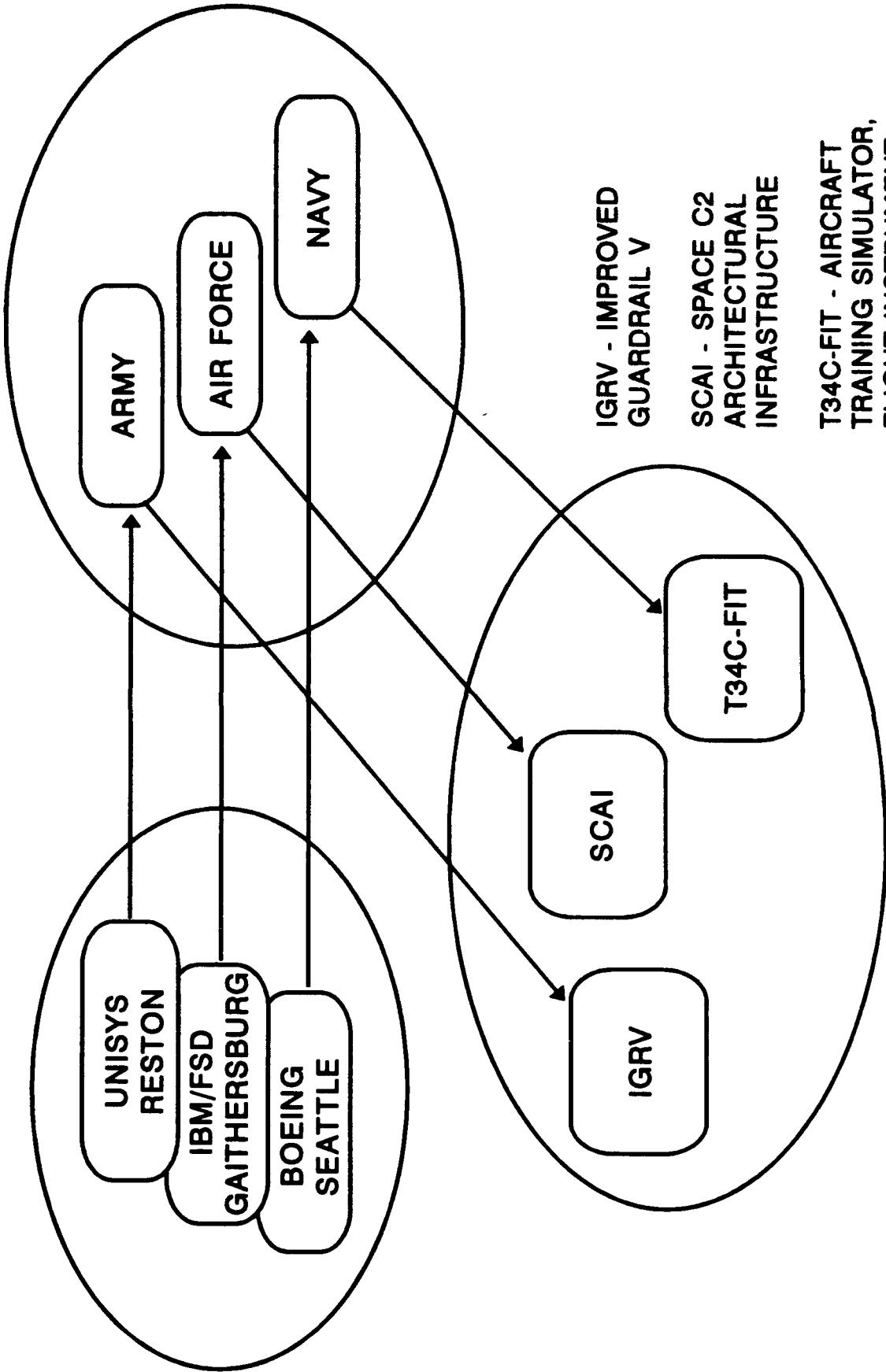
DEFINITION: A DOMAIN IS THE FUNCTIONAL AREA COVERED BY A FAMILY OF SYSTEMS OR ACROSS SYSTEMS WHERE SIMILAR SOFTWARE REQUIREMENTS EXIST

# ARMY STARS DEMONSTRATION PROJECT: INTRODUCTION

- JOINTLY SPONSORED BY CECOM RDEC SED AND STARS
  - MEMO OF AGREEMENT SIGNED BY LTG KIND, DISC4,  
DR. DENMAN, ARPA DIRECTOR, AND  
MG GUENTHER, CG CECOM
  - SED IS TEAMED WITH UNISYS GOVERNMENT SYSTEMS  
GROUP AS STARS PRIME SUPPORTING THE ARMY DEMO  
PROJECT
- DEMONSTRATE BENEFITS OF THE STARS TECHNOLOGY  
THROUGH THE REENGINEERING OF THE ARMY'S IMPROVED  
GUARDRIAL V (IGRV)

# STARS ROLES AND RELATIONSHIPS

## STARS PRIMES      SERVICE COUNTERPARTS



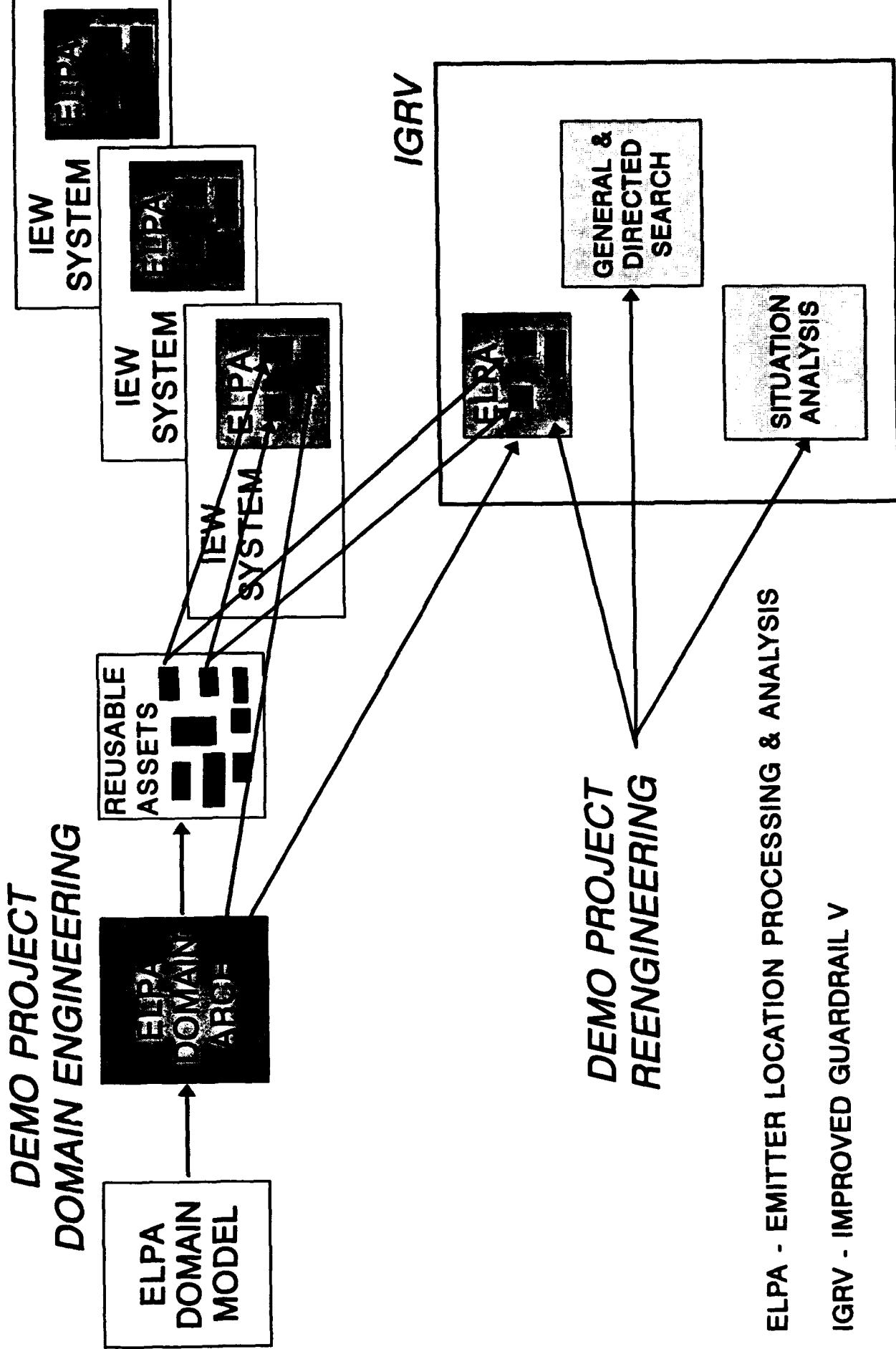
APPLICATIONS

T34C-FIT - AIRCRAFT  
TRAINING SIMULATOR,  
FLIGHT INSTRUMENT  
TRAINER

IGRV - IMPROVED  
GUARDRAIL V

SCAI - SPACE C2  
ARCHITECTURAL  
INFRASTRUCTURE

# ARMY STARS DEMO - APPROACH



# STARS REUSE TECHNOLOGIES LEVERAGED BY ARMY DEMO

- CONCEPTUAL FRAMEWORK FOR REUSE PROCESS
  - REUSE MANAGEMENT - PLAN, ENACT, LEARN
  - REUSE ENGINEERING - CREATE, MANAGE, UTILIZE

# STARS REUSE TECHNOLOGIES LEVERAGED BY ARMY DEMO

## (Continued)

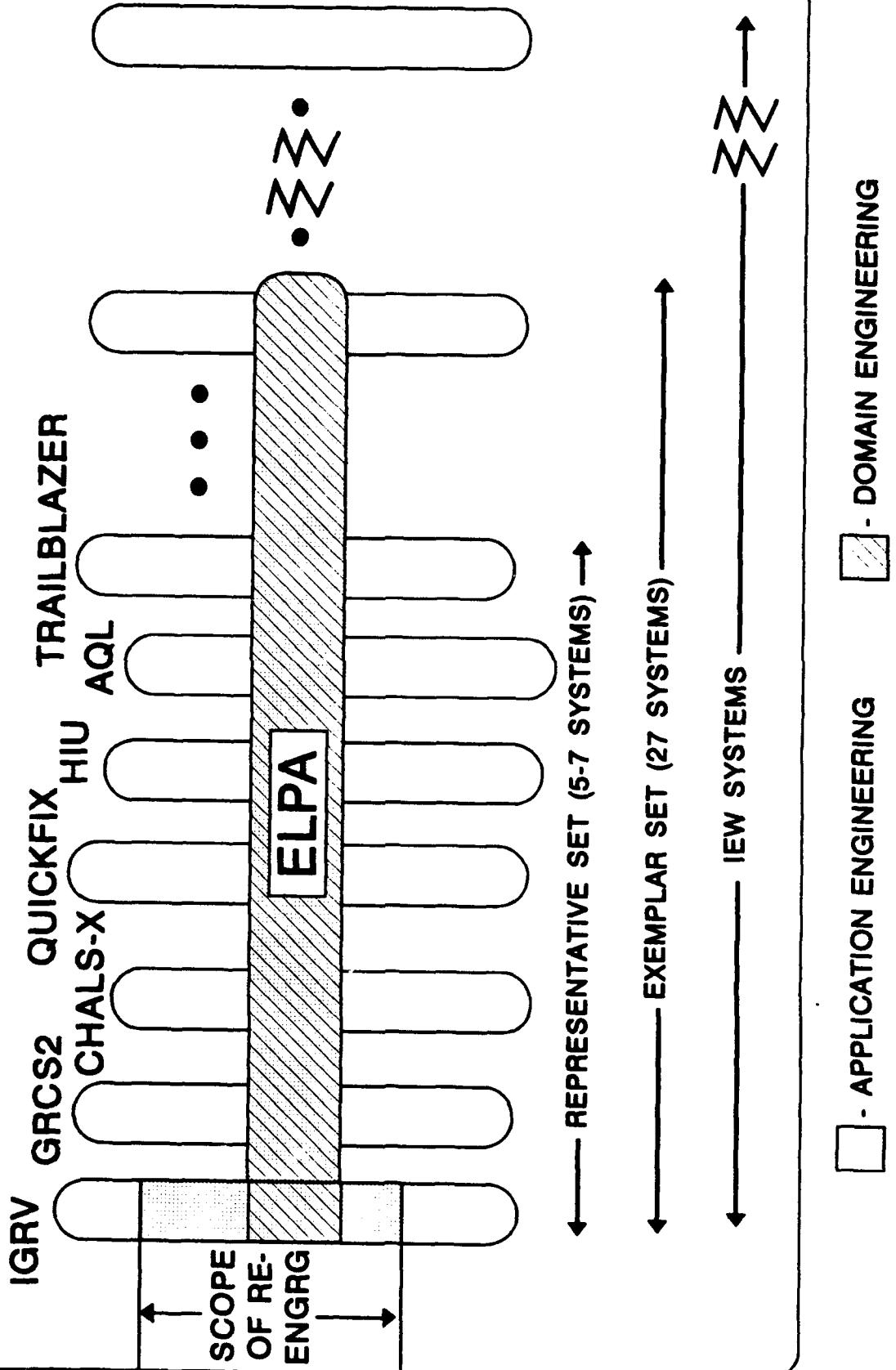
- ORGANIZATIONAL DOMAIN MODELING (ODM)
  - ADVOCATES SEPARATION OF DESCRIPTIVE AND PRESCRIPTIVE ANALYSIS
  - PROVIDES A SET OF WORK PRODUCTS FOR DOMAIN ANALYSIS
  - INDEPENDENT OF SOFTWARE DEVELOPMENT METHOD

# STARS REUSE TECHNOLOGIES LEVERAGED BY ARMY DEMO (Continued)

- REUSE LIBRARY FRAMEWORK (RLF)
  - KNOWLEDGE-BASED TOOL USED FOR A DOMAIN SPECIFIC LIBRARY AND DOMAIN MODELING
  - INCLUDES A GRAPHICAL BROWSER TO ALLOW THE USER TO INTERACT WITH THE LIBRARIES AND DOMAIN MODELS

# SYSTEMATIC APPROACH TO IEW REUSE

## INTELLIGENCE-ELECTRONIC WARFARE DOMAIN



# STRATEGIC REUSE IMPACT ON INDUSTRY

- STRATEGIC REUSE STABILIZES DOMAINS;  
CREATES OPPORTUNITIES FOR INVESTMENT
- DOMAIN MODELS AND ARCHITECTURES:  
PROVIDE THE FOUNDATION FOR BETTER  
REQUIREMENTS DEFINITION; REDUCE COST  
OVERRUNS
- THE ARMY STARS DEMO PROJECT IS A TEST  
CASE; RISK REDUCTION STEP TAKEN BY DoD -  
WILL BENEFIT THE BUSINESS COMMUNITY

# SOFTWARE REUSE PAY-OFF

- INCREASE THE EFFICIENCY OF THE SOFTWARE DEVELOPMENT AND MAINTENANCE PROCESSES
- IMPROVES REQUIREMENTS DEFINITION AND RAPID PROTOTYPING
- THE ARMY STARS DEMO PROJECT PROVIDES AN IMPORTANT FIRST STEP
- THE CECOM RDEC SED APPROACH INCLUDES RISK ANALYSIS AND PLANS FOR TRANSITIONING TO OTHER IEW SYSTEMS AND OTHER SUBDOMAINS OF C3I

# SUMMARY

- CECOM COMMITTED TO DOMAIN-SPECIFIC,  
ARCHITECTURE-BASED REUSE
- REVIEW YOUR BUSINESS STRATEGIES TO  
IDENTIFY AND SCOPE DOMAINS OF INTEREST
- INCORPORATE DOMAIN-SPECIFIC REUSE  
APPROACH INTO PROPOSALS

**TO FURTHER INQUIRE  
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# NOTES

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# **SESSION 2**

## **STREAMLINING THE ACQUISITION APPROACH**



**UNCLASSIFIED**

# **SESSION 2**

## ***OVERVIEW AND INTRODUCTION***

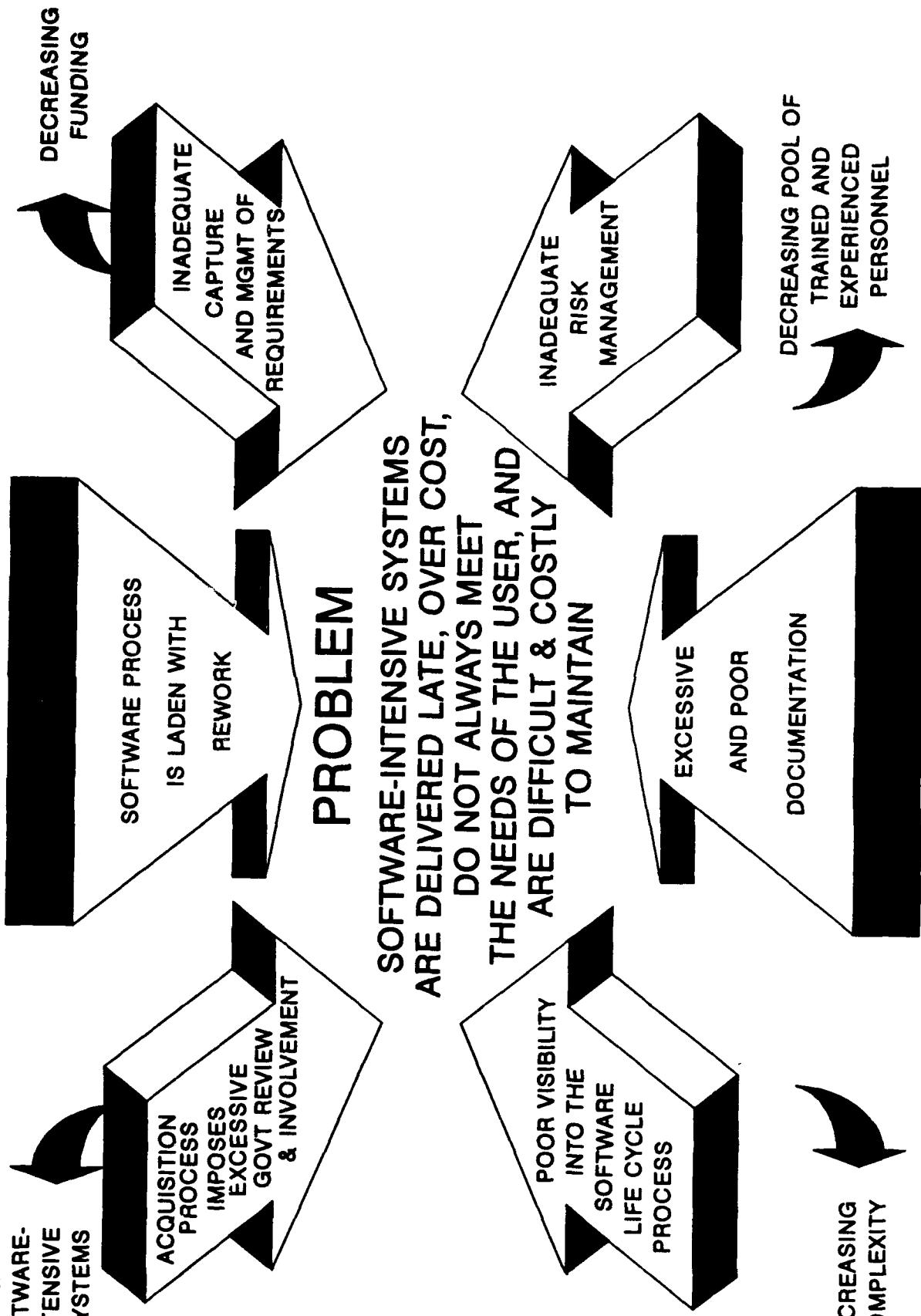
***MODERATOR***

***George E. Sumrall***

**UNCLASSIFIED**

# SOFTWARE ACQUISITION CONCERNNS

INCREASING  
NUMBER OF  
SOFTWARE-  
INTENSIVE  
SYSTEMS



# ACQUISITION STREAMLINING

## MEANS:

- REMOVING OLD BARRIERS
- ADDING FOCUS ON PROCESS AND RISK

## PHILOSOPHY:

- GOVERNMENT WILL SPECIFY "WHAT"
- CONTRACTOR RESPONSIBLE FOR:
  - DETERMINING "HOW-TO"
  - IDENTIFYING AND MANAGING RISK
- ELIMINATING UNNECESSARY DATA ITEMS

# ACQUISITION STREAMLINING (Continued)

## IMPLICATIONS:

- MORE UP-FRONT ENGAGEMENT
- DISCIPLINED, FLEXIBLE, DYNAMIC INTERACTION
  - BEFORE CONTRACT AWARD
  - DURING CONTRACT EXECUTION
- WANT TO AVOID SURPRISES IN PURSUIT OF OUR PRODUCT

# STREAMLINING THE ACQUISITION APPROACH

## PRESENTATIONS

- STREAMLINED ACQUISITION GUIDANCE** – ANDY MILLS
- SOFTWARE CAPABILITY EVALUATION  
AND ITS IMPACT ON THE SOURCE  
SELECTION PROCESS**
- STREAMLINED INTEGRATED SOFTWARE  
METRICS APPROACH** – STEWART FENICK
- CECOM SOFTWARE OMBUDSMAN** – DR. MARTIN WOLFE

**TO FURTHER INQUIRE  
CONTACT:  
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# **NOTES**

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# STREAMLINED ACQUISITION GUIDANCE



Andrew C. Mills

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# SOFTWARE ACQUISITION STREAMLINING

- AN IMPROVED WAY TO:
  - PREPARE SOLICITATIONS
  - SELECT QUALIFIED OFFERORS
  - CONDUCT, MONITOR, AND MANAGE SOFTWARE ACQUISITION
- BASED ON:
  - NOT SPECIFYING "HOW TO DEVELOP" SOFTWARE, BUT "WHAT TO DEVELOP"
  - CHOOSING A "MANAGEABLE" RISK PATH

# STREAMLINED ACQUISITION

## TARGETS FOR IMPROVEMENT

- DOCUMENTATION AND REVIEW PRACTICES
- REDUCTION OF DATA ITEMS
- SHIFT TO INDUSTRY PRACTICES
- PRODUCTIVITY INCREASE
  - WHILE REDUCING RISK IN ACQUISITION

# IMPROVEMENT APPROACH

- FOCUS ON RISK -- SOURCE SELECTION AND AFTER AWARD
- MINIMIZE CONTRACTUAL REQUIREMENTS "WHAT" NOT "HOW"
- SUBSTITUTE CONTRACTOR WORK PRODUCTS FOR DOCUMENTATION
- REPLACE DOCUMENT REVIEW WITH VISIBILITY INTO EMERGING SOFTWARE
- APPROVE BASELINES WHEN THEY ARE STABLE

# STATUS

- OPPORTUNISTIC INCORPORATION OF STREAMLINING METHODOLOGY
- NOW SEEING POSITIVE RESULTS FROM EARLY IMPLEMENTATION
- DEFINED PROCEDURE USED FOR STREAMLINING
- REFINING METHODOLOGY FOR SOLICITATIONS/SOURCE SELECTION

# IMPACTS ON INDUSTRY

- INDUSTRY PROPOSALS MUST BE
  - MANAGEABLE
  - COMPATIBLE WITH STREAMLINING
  - ORIENTED TO RISK REDUCTION
- OFFEROR TO PROVIDE
  - SOFTWARE RISK INFORMATION
  - PLAN FOR RISK ABATEMENT
- RISK MEASURES TO ENSURE
  - SOFTWARE QUALITY
  - TIMELY PRODUCT DELIVERY
  - EARLY RISK IDENTIFICATION

## **IMPACTS ON INDUSTRY**

**(Continued)**

- DEVELOPER RETAINS DESIGN RESPONSIBILITY DURING DEVELOPMENT
- DEVELOPER EXPECTED TO PROVIDE AUTOMATED TOOL ACCESS
- GOVERNMENT ACCESS INFORMATION WITH MINIMAL ASSISTANCE
- LESS WAITING FOR GOVERNMENT REVIEW CYCLE AND COMMENTS

# PAYOUTS

- REDUCED COST, IMPROVED SCHEDULE
- LESS EXTRANEOUS DOCUMENTATION
- EASIER GOVERNMENT/CONTRACTOR  
INTERACTION, MORE VISIBILITY
- TECHNOLOGY USE ENABLED
- MORE FRIENDLY TO INDUSTRY
- BETTER HANDLING OF RISK

# SUMMARY

- FOCUS ON RISK -- SOURCE SELECTION AND AFTER AWARD
- MINIMIZE CONTRACTUAL REQUIREMENTS "WHAT" NOT "HOW"
- SUBSTITUTE CONTRACTOR WORK PRODUCTS FOR DOCUMENTATION
- REPLACE DOCUMENT REVIEW WITH VISIBILITY INTO EMERGING SOFTWARE
- APPROVE BASELINES WHEN THEY ARE STABLE

*TO FURTHER INQUIRE  
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# **NOTES**

# SOFTWARE CAPABILITY EVALUATIONS AND THEIR IMPACT ON THE SOURCE SELECTION PROCESS



*Jeffrey Herman*

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# OBJECTIVES

- EXPLAIN EVOLUTION OF SCE
- DEFINE SOFTWARE CAPABILITY EVALUATIONS (SCE)
- DESCRIBE GOALS OF THE SCE
- SOURCE SELECTION EFFECTS AND RESULTS
- EXPLAIN DIFFERENCE BETWEEN SCE AND SPA
- CECOM SED INVOLVEMENT
- BENEFITS OF SCE

# THE MATURITY MODEL FRAMEWORK

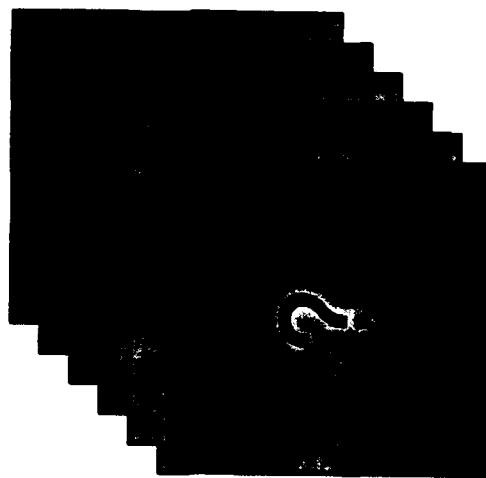
A RELATIVE SCALE AND MATRIX USED TO  
ASSIST AN ORGANIZATION IN DETERMINING  
WHERE ITS SOFTWARE PRACTICE IS TODAY  
AND WHERE IT CAN BE TOMORROW

# MATURITY MODEL FRAMEWORK

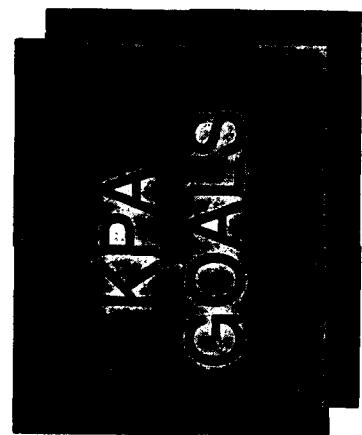
LEVEL	CHARACTERISTIC	KEY PROCESS AREAS	RISKS	
			PRODUCTIVITY & QUALITY	RISK
OPTIMIZING	IMPROVEMENT FEED BACK INTO PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
MANAGED	(QUANTITATIVE) MEASURED PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
DEFINED	(QUALITATIVE) PROCESS DEFINED AND INSTITUTIONALIZED	ORGANIZATION PROCESS FOCUS ORGANIZATION PROCESS DEFINITION TRAINING PROGRAM INTEGRATED SOFTWARE MANAGEMENT SOFTWARE PRODUCT ENGINEERING INTER GROUP COORDINATION		
REPEATABLE	(INTUITIVE) PROCESS DEPENDENT ON INDIVIDUALS	REQUIREMENTS MANAGEMENT SOFTWARE PROJECT PLANNING SOFTWARE PROJECT TRACKING SOFTWARE SUBCONTRACT MANAGEMENT SOFTWARE QUALITY ASSURANCE SOFTWARE CONFIGURATION CONTROL		
INITIAL	(INFORMAL)			RISK

# SCE METHOD EVOLUTION 1987- PRESENT

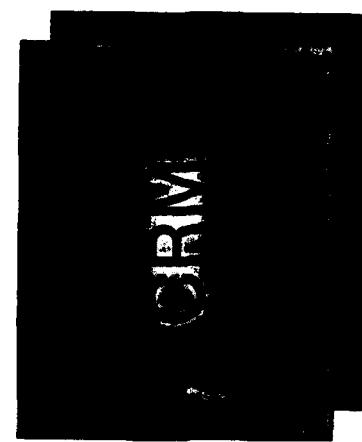
1987



1991



1993

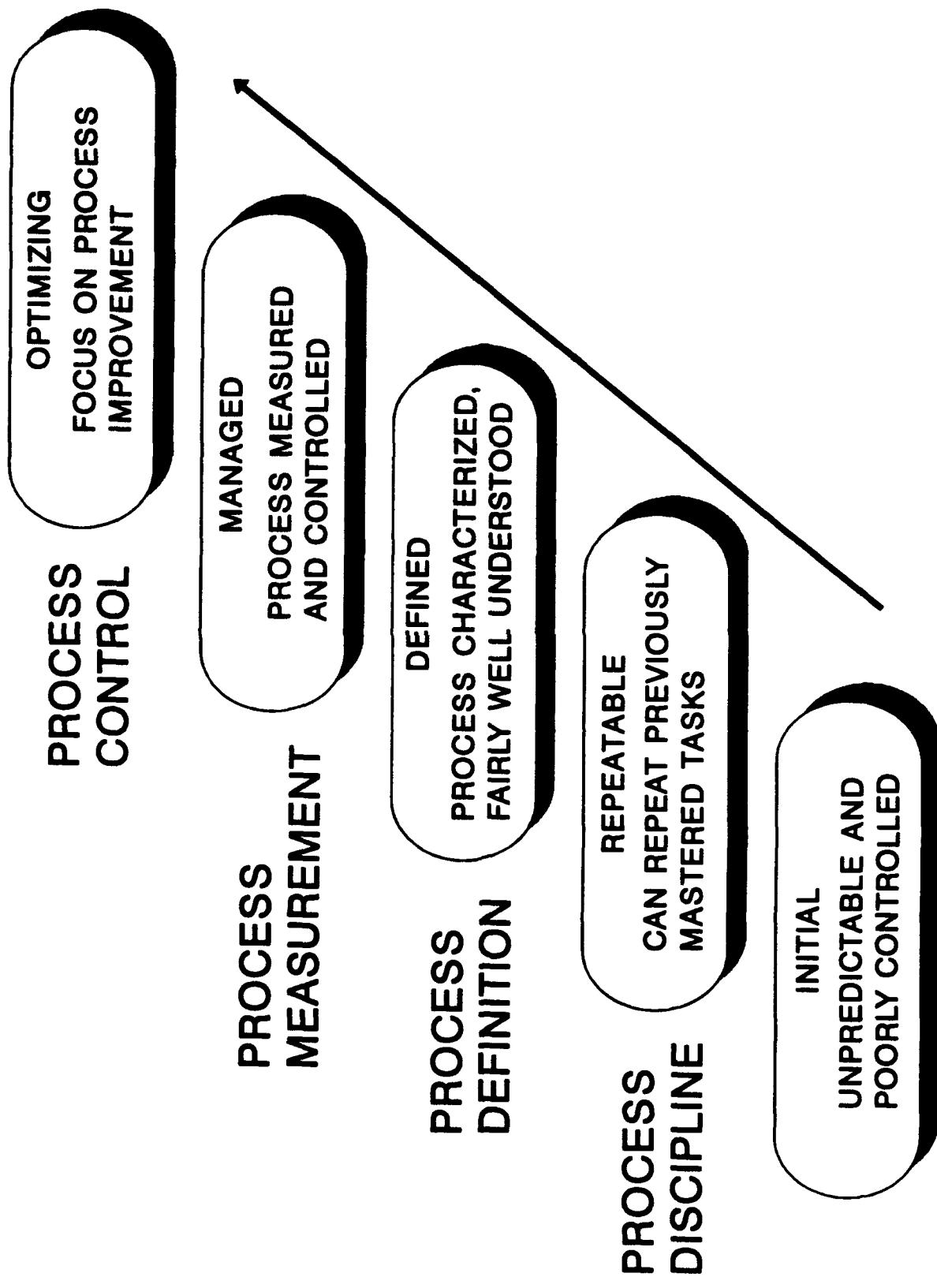


# SOFTWARE CAPABILITY EVALUATION DEFINITION

A METHOD TO EVALUATE THE SOFTWARE PROCESS CAPABILITY OF ORGANIZATIONS TO GAIN INSIGHT INTO THEIR SOFTWARE DEVELOPMENT CAPABILITY

- A STRUCTURED APPROACH TO COLLECT DATA RELEVANT TO AN ORGANIZATION'S SOFTWARE PROCESSES
- DATA EVALUATED AGAINST A DEFINED STANDARD WHICH HAS STRUCTURAL FEATURES TO FACILITATE COMMUNICATIONS AMONG USERS
- PERFORMED BY A TRAINED TEAM KNOWLEDGEABLE IN SOFTWARE ENGINEERING PROCESSES

# SOFTWARE ENGINEERING PROCESS IMPROVEMENT



# MATURITY MODEL FRAMEWORK-INITIAL LEVEL

LEVEL	CHARACTERISTICS	KEY PROCESS AREAS	RESULTS	PRODUCTIVITY & QUALITY
5 OPTIMIZING	IMPROVEMENT FEED BACK INTO PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
4 MANAGED	(QUANTITATIVE) MEASURED PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
3 DEFINED		(QUALITATIVE) PROCESS DEFINED AND INSTITUTIONALIZED	ORGANIZATION PROCESS FOCUS ORGANIZATION PROCESS DEFINITION TRAINING PROGRAM INTEGRATED SOFTWARE MANAGEMENT SOFTWARE PRODUCT ENGINEERING INTER GROUP COORDINATION	
2 REPEATABLE			REQUIREMENTS MANAGEMENT SOFTWARE PROJECT PLANNING SOFTWARE PROJECT TRACKING SOFTWARE SUBCONTRACT MANAGEMENT SOFTWARE QUALITY ASSURANCE SOFTWARE CONFIGURATION CONTROL	
1 INITIAL				RISK

# INITIAL LEVEL ORGANIZATION CASE STUDY

## LEVEL 1 - INITIAL

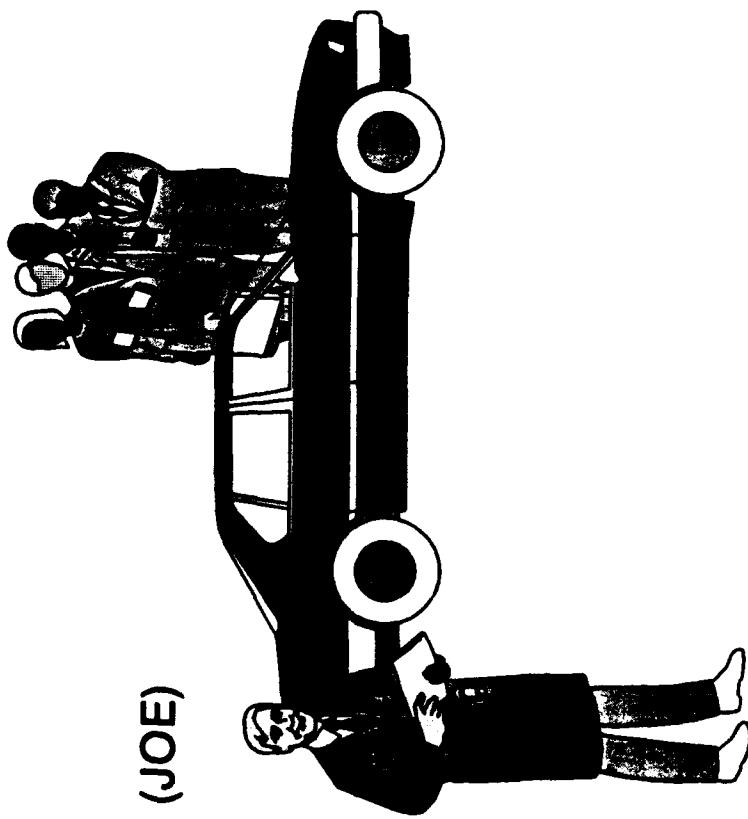
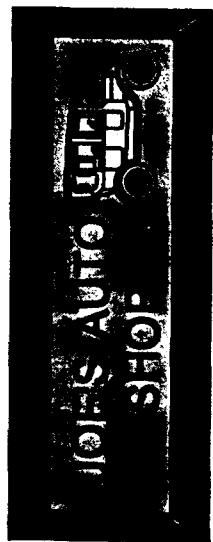
JOE IS AN EXPERIENCED AUTO  
MECHANIC

JOE OPENS AN AUTO SHOP

JOE HIRES SOME EXPERT  
MECHANICS

EACH MECHANIC DOES A  
TUNE-UP, BRAKE JOB, AND  
WHEEL ALIGNMENT IN HIS/HER  
OWN WAY

THE JOB IS ONLY AS GOOD AS  
THE MECHANIC



# INITIAL MATURITY LEVEL

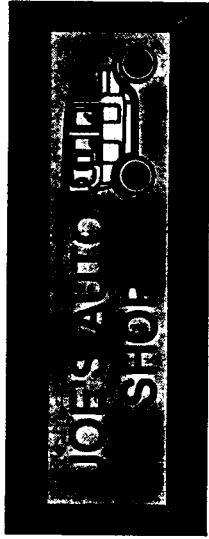
81% OF ORGANIZATIONS THAT HAVE BEEN  
ASSESSED ARE AT LEVEL 1 (INITIAL)

# MATURITY MODEL FRAMEWORK-REPEATABLE LEVEL

LEVEL	CHARACTERISTIC	KEY PROCESS AREAS	RESULTS	RISK
			PRODUCTIVITY & QUALITY	
5 OPTIMIZING	IMPROVEMENT FED BACK INTO PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
4 MANAGED	(QUANTITATIVE) MEASURED PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
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2 REPEATABLE	(INTUITIVE) PROCESS DEPENDENT ON INDIVIDUALS	REQUIREMENTS MANAGEMENT SOFTWARE PROJECT PLANNING SOFTWARE PROJECT TRACKING SOFTWARE SUBCONTRACT MANAGEMENT SOFTWARE QUALITY ASSURANCE SOFTWARE CONFIGURATION CONTROL		
1 INITIAL	(INFORMAL)			

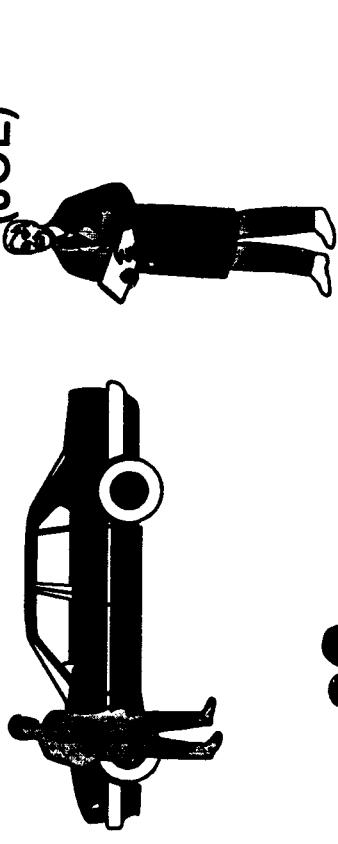
# REPEATABLE LEVEL ORGANIZATION CASE STUDY

## LEVEL 2 - REPEATABLE



JOE TALKS TO HIS MECHANICS  
ABOUT SOME COMMON PRACTICES

(JOE)

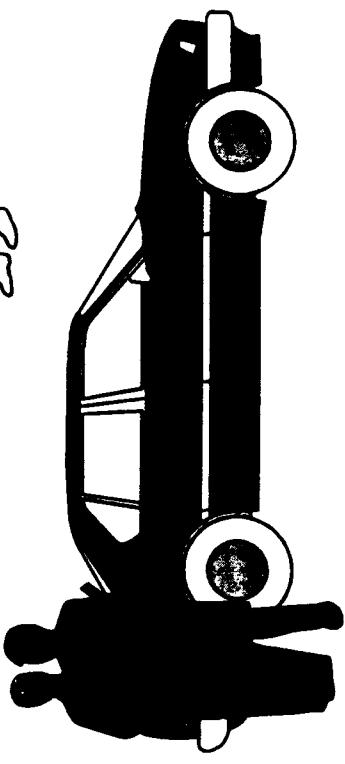


JOE CAN NOW ESTIMATE HOW LONG  
A JOB WILL TAKE

JOE CAN NOW TAKE APPOINTMENTS  
AND SCHEDULE TASKS FOR  
MECHANICS

JOE CHECKS QUALITY OF WORK

PROBLEMS ARISE WHEN SOMETHING  
NEW IS INTRODUCED TO THE  
PROCESS



# **REPEATABLE MATURITY LEVEL**

**12% OF ORGANIZATIONS THAT HAVE BEEN  
ASSESSED ARE AT LEVEL 2 (REPEATABLE)**

# MATURITY MODEL FRAMEWORK-DEFINED LEVEL

LEVEL	CHARACTERISTIC	KEY PROCESS AREAS	RISE/SINK	RISK
			PRODUCTIVITY & QUALITY	
5 OPTIMIZING	IMPROVEMENT FEED BACK INTO PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
4 MANAGED	(QUANTITATIVE) MEASURED PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
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1 INITIAL	(INFORMAL)			

# DEFINED LEVEL ORGANIZATION CASE STUDY

## LEVEL 3 - DEFINED

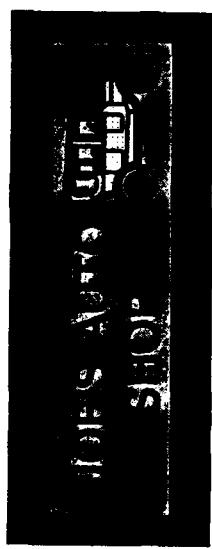
JOE WRITES THE PROCESS DOWN  
SO THERE IS NO CONFUSION

MECHANICS COME AND GO, BUT JOE  
CAN TRAIN THE NEW STAFF

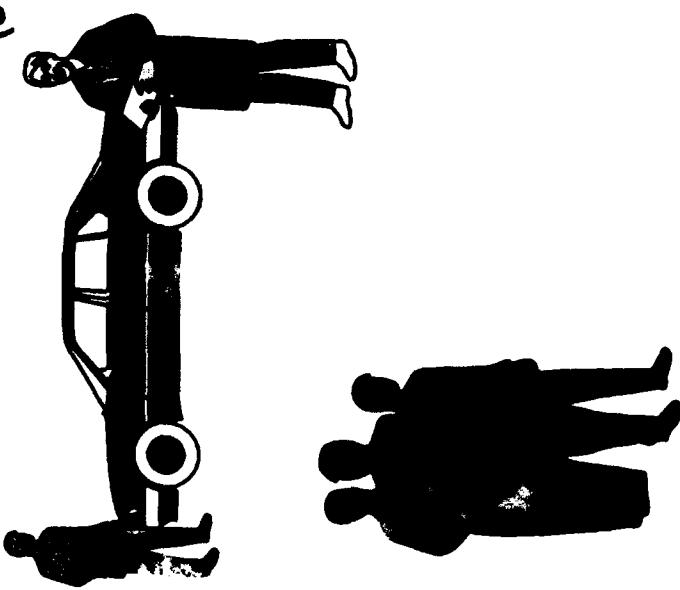
THE AUTO JOBS ARE TAILORED  
WHEN NECESSARY FOR NEW  
SITUATIONS

JOE AND THE MECHANICS MEET  
REGULARLY TO DISCUSS PROCESS  
IMPROVEMENTS

JOE WISHES HE KNEW HOW TO  
IMPROVE PRODUCTIVITY



(JOE)



# DEFINED MATURITY LEVEL

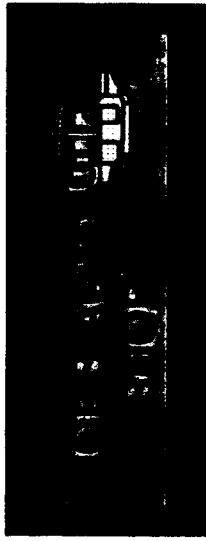
7% OF ORGANIZATIONS THAT HAVE BEEN  
ASSESSED ARE AT LEVEL 3 (DEFINED)

# MATURITY MODEL FRAMEWORK-MANAGED LEVEL

LEVEL	CHARACTERISTICS	KEY PREDICTION AREAS	RESULTS
5 OPTIMIZING	IMPROVEMENT FEED BACK INTO PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT	PRODUCTIVITY & QUALITY
4 MANAGED	(QUANTITATIVE) MEASURED PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT	
3 DEFINED	(QUALITATIVE) PROCESS DEFINED AND INSTITUTIONALIZED	ORGANIZATION PROCESS FOCUS ORGANIZATION PROCESS DEFINITION TRAINING PROGRAM INTEGRATED SOFTWARE MANAGEMENT SOFTWARE PRODUCT ENGINEERING INTER GROUP COORDINATION	
2 REPEATABLE	(INTUITIVE) PROCESS DEPENDENT ON INDIVIDUALS	REQUIREMENTS MANAGEMENT SOFTWARE PROJECT PLANNING SOFTWARE PROJECT TRACKING SOFTWARE SUBCONTRACT MANAGEMENT SOFTWARE QUALITY ASSURANCE SOFTWARE CONFIGURATION CONTROL	
1 INITIAL	(INFORMAL)		RISK

# MANAGED LEVEL ORGANIZATION CASE STUDY

## LEVEL 4 - MANAGED

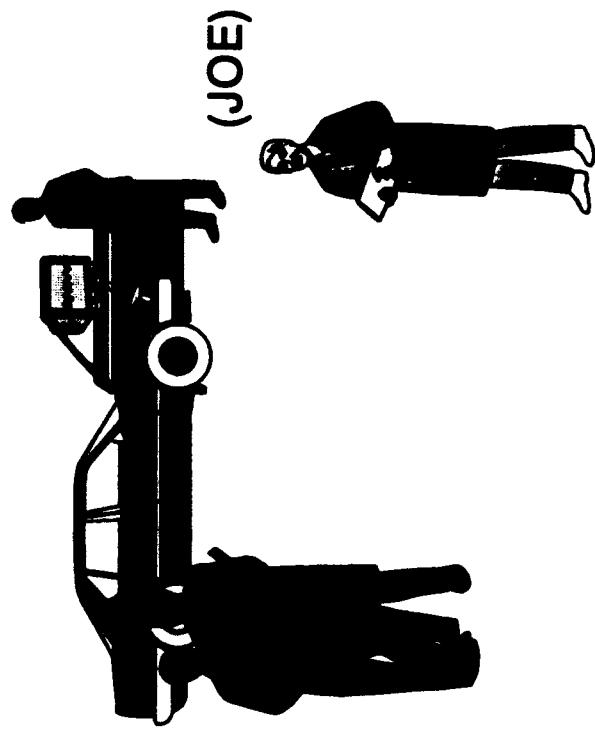


JOE PUTS MEASURES IN PLACE TO TRACK PRODUCTIVITY AND QUALITY

JOE BEGINS TO IDENTIFY WHERE THE BOTTLENECKS IN THE AUTO REPAIR TASKS ARE

JOE IDENTIFIES THE NEED FOR AUTOMATIC TEST EQUIPMENT TO INCREASE PRODUCTIVITY AND REDUCE HUMAN ERROR

JOE WISHES HE COULD SOLVE PROBLEMS BEFORE THEY GET TOO BIG



# MANAGED MATURITY LEVEL

0% OF ORGANIZATIONS THAT HAVE BEEN  
ASSESSED ARE AT LEVEL 4 (MANAGED)

# MATURITY MODEL FRAMEWORK-OPTIMIZING LEVEL

LEVEL	CHARACTERISTIC	KEY PROCESS AREAS	RISKS	PRODUCTIVITY & QUALITY
5 OPTIMIZING	IMPROVEMENT FED BACK INTO PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
4 MANAGED	(QUANTITATIVE) MEASURED PROCESS	DEFECT PREVENTION TECHNOLOGY CHANGE MANAGEMENT PROCESS CHANGE MANAGEMENT		
3 DEFINED	(QUALITATIVE) PROCESS DEFINED AND INSTITUTIONALIZED	ORGANIZATION PROCESS FOCUS ORGANIZATION PROCESS DEFINITION TRAINING PROGRAM INTEGRATED SOFTWARE MANAGEMENT SOFTWARE PRODUCT ENGINEERING INTER GROUP COORDINATION		
2 REPEATABLE	(INTUITIVE) PROCESS DEPENDENT ON INDIVIDUALS	REQUIREMENTS MANAGEMENT SOFTWARE PROJECT PLANNING SOFTWARE PROJECT TRACKING SOFTWARE SUBCONTRACT MANAGEMENT SOFTWARE QUALITY ASSURANCE SOFTWARE CONFIGURATION CONTROL		
1 INITIAL	(INFORMAL)			RISK

# OPTIMIZING LEVEL ORGANIZATION CASE STUDY

## LEVEL 5 - OPTIMIZING

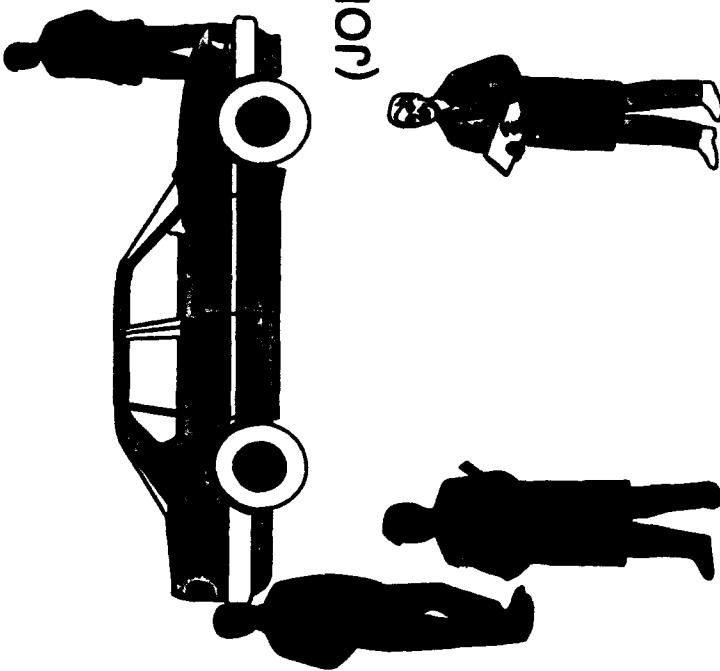
JOE NOW COLLECTS DETAILED METRICS ON THE PROCESS

JOE CAN ANTICIPATE A PROBLEM BEFORE IT BECOMES A BIG PROBLEM

JOE AND HIS MECHANICS ARE IN A CONSTANT CYCLE OF PROCESS IMPROVEMENTS

THE AUTO REPAIR PROCESS IN JOE'S SHOP IS GETTING BETTER ALL THE TIME

JOE'S AUTO SHOP CAN HEAD OFF PROBLEMS EARLY AND INFUSE NEW TECHNOLOGY; THE PROCESS IS EVOLVING



# SELECTION OF TARGET PROCESS CAPABILITY

- THE TARGET PROCESS CAPABILITY (TPC) IS THE STANDARD BY WHICH ALL OFFERORS ARE TO BE EVALUATED
- A SUBSET OF THE KEY PROCESS AREAS (KPAs) IDENTIFIED IN THE CAPABILITY MATURITY MODEL (CMM) WILL BE SELECTED BASED ON THEIR CRITICALITY TO THIS ACQUISITION
- THE TPC IS THE COMBINATION OF THE CRITICAL KPAS AND THE OTHER KPAS BELOW THE CRITICAL KPAS ON THE CMM

# CRITICAL SUBPROCESS AREAS

WHAT

- THE SUBPROCESS AREAS WHICH ARE MOST PERTINENT TO PROJECT RISK

WHY

- TO FOCUS THE INVESTIGATION

HOW

- SELECTED THROUGH ANALYSIS OF THE
  - ORGANIZATIONS' PROPOSED PROJECT PROFILE REPRESENTING THE EXPERIENCE THAT IS NEEDED
  - ORGANIZATIONS' PROJECT PROFILES REPRESENTING THEIR EXPERIENCE
  - TARGET PROCESS CAPABILITY REPRESENTING THE CUSTOMER'S VIEW OF WHAT IS DESIRED

# SCE TEAM COMPOSITION

- CORE DRAWN FROM WITHIN THE EVALUATING ORGANIZATION
- 4-6 TOTAL (SOFTWARE/ACQUISITION PEOPLE)
- 2-3 SENIOR PEOPLE (7 YEARS EXPERIENCE)
- 2 PEOPLE WITH PRIOR SCE EXPERIENCE
- ONE INEXPERIENCED MEMBER AT MOST

# TEAM PROFILE

- WORKING UNDERSTANDING OF THE CAPABILITY MATURITY MODEL
- EXPERIENCE REQUIRED
  - SOFTWARE DEVELOPMENT
  - SOFTWARE MANAGEMENT
  - ACQUISITION
- SKILLS REQUIRED
  - INTERPERSONAL RELATIONSHIP
  - PLANNING AND ORGANIZING
- ATTRIBUTES
  - PATIENCE
  - PERSEVERANCE

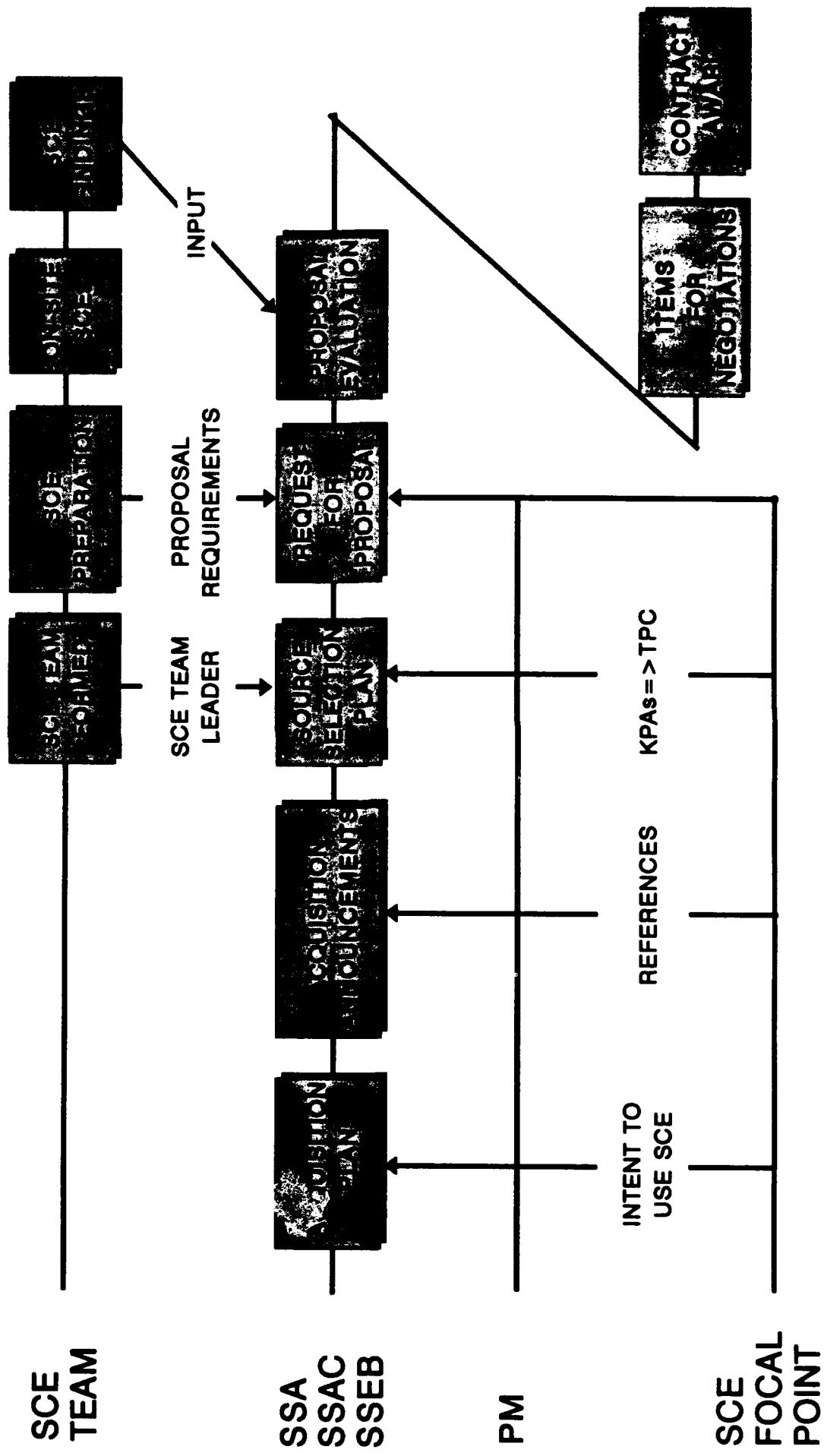
# PROFESSIONAL JUDGEMENT

- THE EVALUATION TEAM NEEDS TO KNOW HOW TO EVALUATE THE ORGANIZATION IN RELATION TO THE MATURITY MODEL
- DIFFERENT ORGANIZATIONS HAVE DIFFERENT PROFILES
  - SMALL, MEDIUM, AND LARGE PROJECTS
  - MATRIX OR LINE ORGANIZATIONAL STRUCTURE
  - DIFFERENT DEVELOPMENT METHODOLOGIES
  - DIFFERENT CONTRACT ARRANGEMENTS
  - DIFFERENT APPLICATION DOMAINS
- THE TEAM NEEDS SUFFICIENT SOFTWARE ENGINEERING AND MANAGEMENT EXPERIENCE TO EXERCISE JUDGEMENT

# GOALS OF THE SCE

- TO MAKE HIGHER QUALITY SOURCE SELECTION DECISION BY VERIFYING THAT THE KEY PROCESS AREAS THAT ARE REQUIRED TO SUCCESSFULLY DEVELOP THE SYSTEM ARE ADEQUATELY ADDRESSED BY THE CONTRACTOR
- IDENTIFY AREAS OF RISK IN THE CONTRACTOR'S SOFTWARE DEVELOPMENT PROCESS FOR RISK MITIGATION DURING CONTRACT MONITORING
- USE AS THE METRIC FOR PROCESS IMPROVEMENT AWARD INCENTIVES
- SEND A MESSAGE TO CONTRACTORS THAT A MATURE AND IMPROVING SOFTWARE DEVELOPMENT PROCESS IS IMPORTANT TO DoD

# SOURCE SELECTION ACTIVITIES AFFECTED BY THE SCE



# FINDINGS

- PROJECT MANAGEMENT
- SOFTWARE QUALITY ASSURANCE
- COST/SIZE ESTIMATION
- SUBCONTRACTOR MANAGEMENT

# SOURCE SELECTION RISKS

- TO DATE, NO CONTRACT AWARD HAS BEEN HELD UP BECAUSE OF QUESTIONS RAISED ABOUT THE SCE FINDINGS
- TO DATE, NO SOURCE SELECTION HAS BEEN DELAYED BECAUSE OF THE SCE PROCESS

# SAMPLE SCE RESULTS

## PROJECT MANAGEMENT

- COMMITMENT PROCESS AT SENIOR AND FIRST-LINE MANAGEMENT LEVELS REQUIRES STRENGTHENING

- STRENGTHS

- PROJECT RESPONSIBILITIES ARE DEFINED AND DOCUMENTED
- MECHANISM IN PLACE TO ASSURE THAT SOFTWARE SUBCONTRACTORS FOLLOW A DISCIPLINED SOFTWARE DEVELOPMENT PROCESS

- WEAKNESSES

- COMMITMENT PROCEDURES AT SENIOR AND FIRST-LINE MANAGEMENT LEVELS COULD NOT BE VALIDATED BY THE TEAM
- MANAGEMENT ATTENTION TO TESTING AND PROGRESS OF TESTING APPEARED TO BE LACKING IN ALL PROJECTS INVESTIGATED

- IMPROVEMENT ACTIVITIES

- TASK GROUP IS IN PLACE TO ADDRESS SENIOR MANAGEMENT ISSUE

# DOCUMENTATION TO LOOK FOR

- SIGNATURE BLOCK
- DOCUMENT DATE
- VERSION NUMBER
- ENFORCEMENT DATE
  - IF DOCUMENTS, WHICH WERE REQUESTED IN WRITING, ARE NOT PRESENT AT THE TIME OF THE DOCUMENT REVIEW, THEY WILL BE CONSIDERED NONEXISTENT. ANY INFORMATION REFERENCING SUCH DOCUMENTS WILL BE CONSIDERED FALSE INFORMATION.

# A COMPARISON

## EVALUATIONS

- FOR GOVERNMENT'S USE IN SOURCE SELECTION OR CONTRACT MONITORING
- RESULTS KNOWN TO THE GOVERNMENT
- SUBSTANTIATE CURRENT PRACTICE
- ASSESS CONTRACTOR COMMITMENT TO IMPROVE
- ANALYZE CONTRACT PERFORMANCE POTENTIAL

## ASSESSMENTS

- FOR THE USE OF THE ORGANIZATION
- RESULTS ARE CONFIDENTIAL
- ASSESS CURRENT PRACTICE
- ACT AS CATALYSTS FOR IMPROVEMENT
- PROVIDE INPUT FOR IMPROVEMENT ACTION PLAN

IDENTIFY RISKS AND MOTIVATE CHANGES IN CONTRACTOR'S SOFTWARE MANAGEMENT AND ENGINEERING PRACTICES.

CHARACTERIZE THE CONTRACTOR'S CURRENT SOFTWARE ENGINEERING PROCESS. IDENTIFY THE MOST CRITICAL PROCESS ISSUES. FACILITATE THE INITIATION OF PROCESS IMPROVEMENT ACTIONS.

## AN ANALOGY

- AN ASSESSMENT IS LIKE ASKING YOUR BROTHER-IN-LAW TO HELP YOU PREPARE YOUR INCOME TAXES
- AN EVALUATION IS LIKE HAVING THE IRS DO AN AUDIT OF YOUR TAXES

# CECOM SED INVOLVEMENT

## TRAINING

- TRAINED 104 SED PERSONNEL TO DATE
- 1-DAY EXECUTIVE OVERVIEW DESIGNED FOR MANAGERS;  
22 PEOPLE ATTENDED

## SEI INTERFACE

- HAS REPRESENTATION ON THE SCE ADVISORY BOARD
- PARTICIPATES IN WORKSHOPS AND SEMINARS HELD BY SEI
- DEVELOPED 2 DRAFT REGULATIONS
- IMPLEMENTATION GUIDE
- JUST IN TIME TRAINING

# IMPACT ON INDUSTRY

- SCE MENTION AMONG GENERAL NOTICES TO OFFERORS
- RFP SECTION M NOTICE ABOUT SCE ROLE IN EVALUATION FACTORS FOR AWARD
- RFP SECTION L CONTAINS PROPOSAL PREPARATION INSTRUCTIONS ABOUT ANSWERING SCE QUESTIONNAIRE, SUBMITTING PROJECT PROFILES, AND GENERATING THE SCE APPENDIX
- PREPARATION TIME ALLOCATION FOR SCE
- TRAINING OF PERSONNEL IN THE CMM AND SCE METHODOLOGY

# BENEFITS OF THE SCE

- SCE INTRODUCES REALISM INTO THE PROPOSAL REVIEW PROCESS
- SCE INFORMATION IS TIMELY, REAL, AND BASED ON CURRENT PROJECTS/PRactices
- SCE HELPS TO CLARIFY THE OFFEROR'S SOFTWARE DEVELOPMENT PLAN (SDP)
- BETTER IDENTIFY AND EVALUATE THE RISKS POSED BY EACH CONTRACTOR TEAM
- SCE INTRODUCES OBJECTIVITY INTO THE PROPOSAL REVIEW (TRAINED TEAM COMPARING EACH OFFEROR TO A STANDARD, i.e., CMM)
- MANAGE RISK AFTER CONTRACT AWARD

# SUMMARY

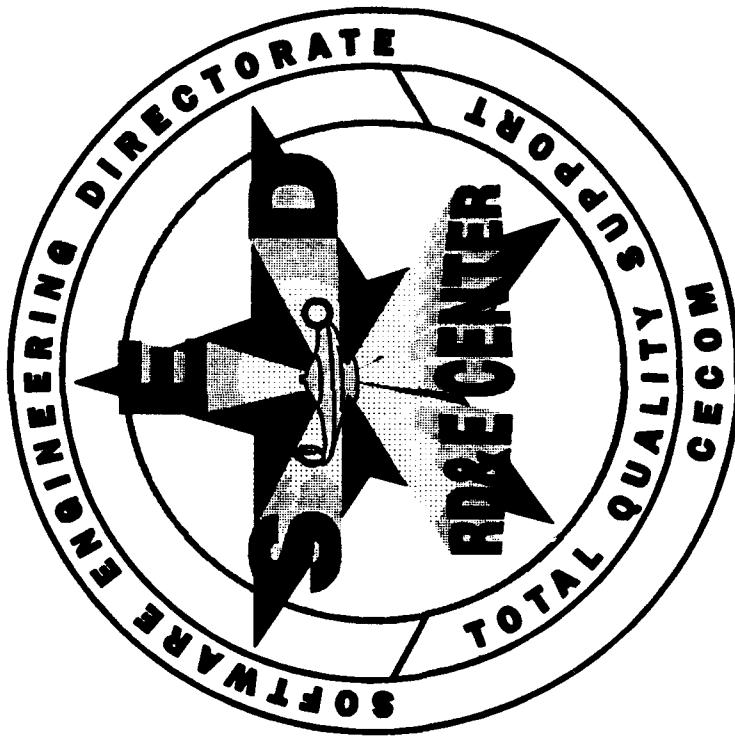
- SCEs HAVE BECOME A COMMON PRACTICE IN SOURCE SELECTION
- HELPS CONTRACTOR FOCUS INTERNAL PROCESS IMPROVEMENT

MATURE AND IMPROVING SOFTWARE DEVELOPMENT PROCESS IS:

- IMPORTANT TO DoD
- INTEGRAL TO COMPETITIVE EDGE

# **NOTES**

# STREAMLINED INTEGRATED SOFTWARE METRICS APPROACH



*Stewart Fenick*

**UNCLASSIFIED**

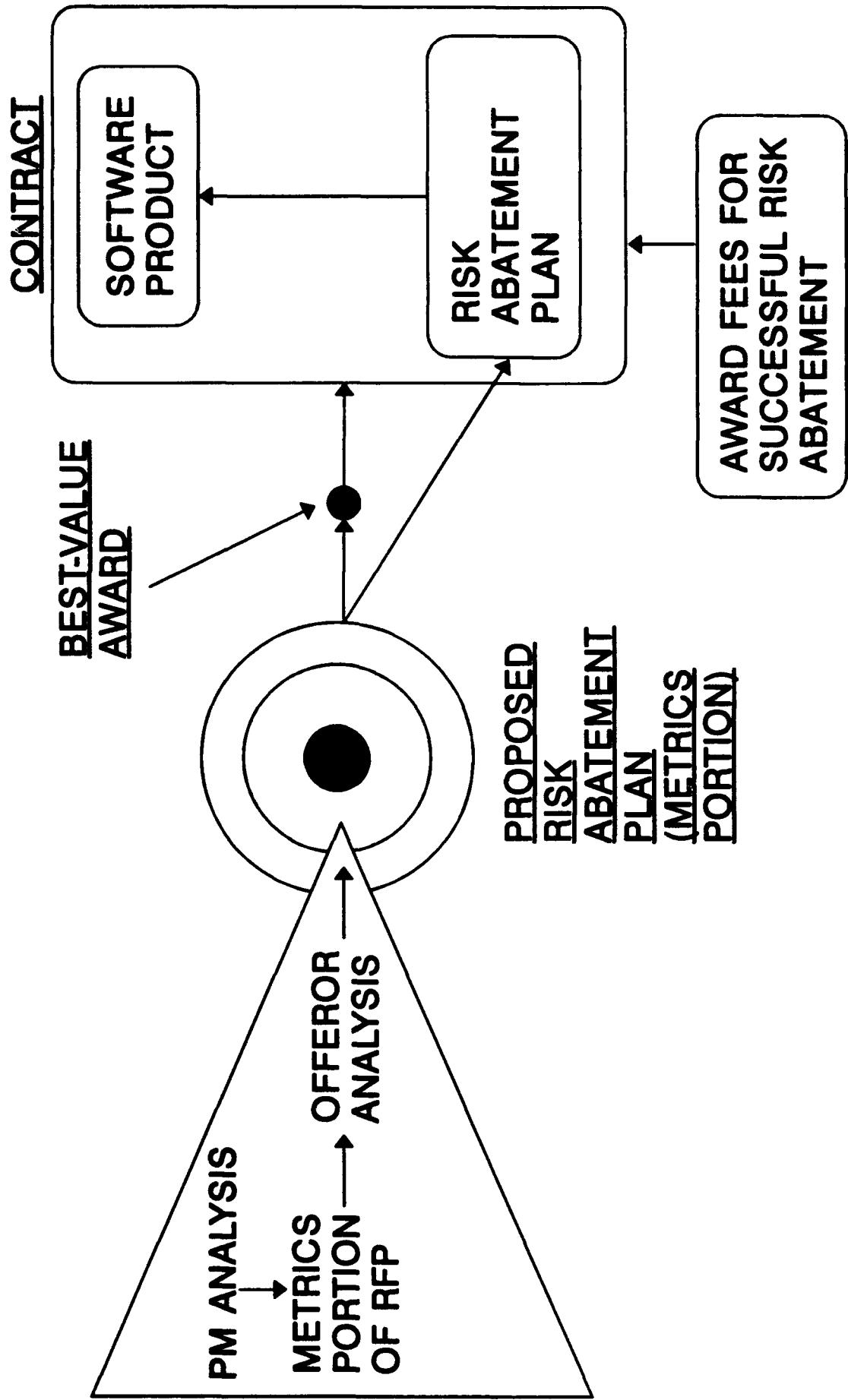
# SOFTWARE MEASUREMENT

A CRITICAL TOOL FOR  
GOVERNMENT AND INDUSTRY  
TO ENSURE THE DISCIPLINED  
CREATION AND EXECUTION OF  
SOFTWARE CONTRACTUAL  
EFFORTS

# **PROBLEMS WITH CURRENT METRICS APPROACHES**

- METRICS SET PROLIFERATION
- SHORT-TERM PROBLEM SOLUTIONS NOT BEING EXTENDED TO LONG-TERM PROBLEM ELIMINATION

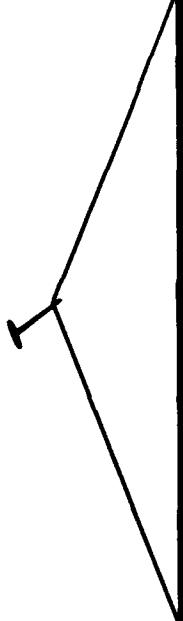
# CECOM'S METRICS APPROACH



# PROGRAM MANAGER ANALYSIS

- PRODUCT REQUIREMENTS
- ARMY METRICS POLICIES - e.g., STEP
- CECOM INTEGRATED METRICS FRAMEWORK GUIDELINES
  - EXECUTIVE MANAGEMENT METRICS
  - STATE-OFF-THE-PRACTICE METRICS SETS
  - FRAMEWORK COMPONENTS
  - PROGRAM ISSUES

# EXECUTIVE MANAGEMENT METRICS



PROVIDING THE BIG PICTURE TO THOSE WHO CAN DO THE MOST ABOUT IT

"STEPPING BACK FROM DETAILS; LOOKING AT TRENDS; AND BRINGING TIMELY INFORMATION TO THE LEVEL OF THOSE WITH THE BEST OVERALL VIEW AND BEST ABILITIES FOR MAKING PROGRAM DECISIONS . . . . AND, THE MOST AT STAKE"

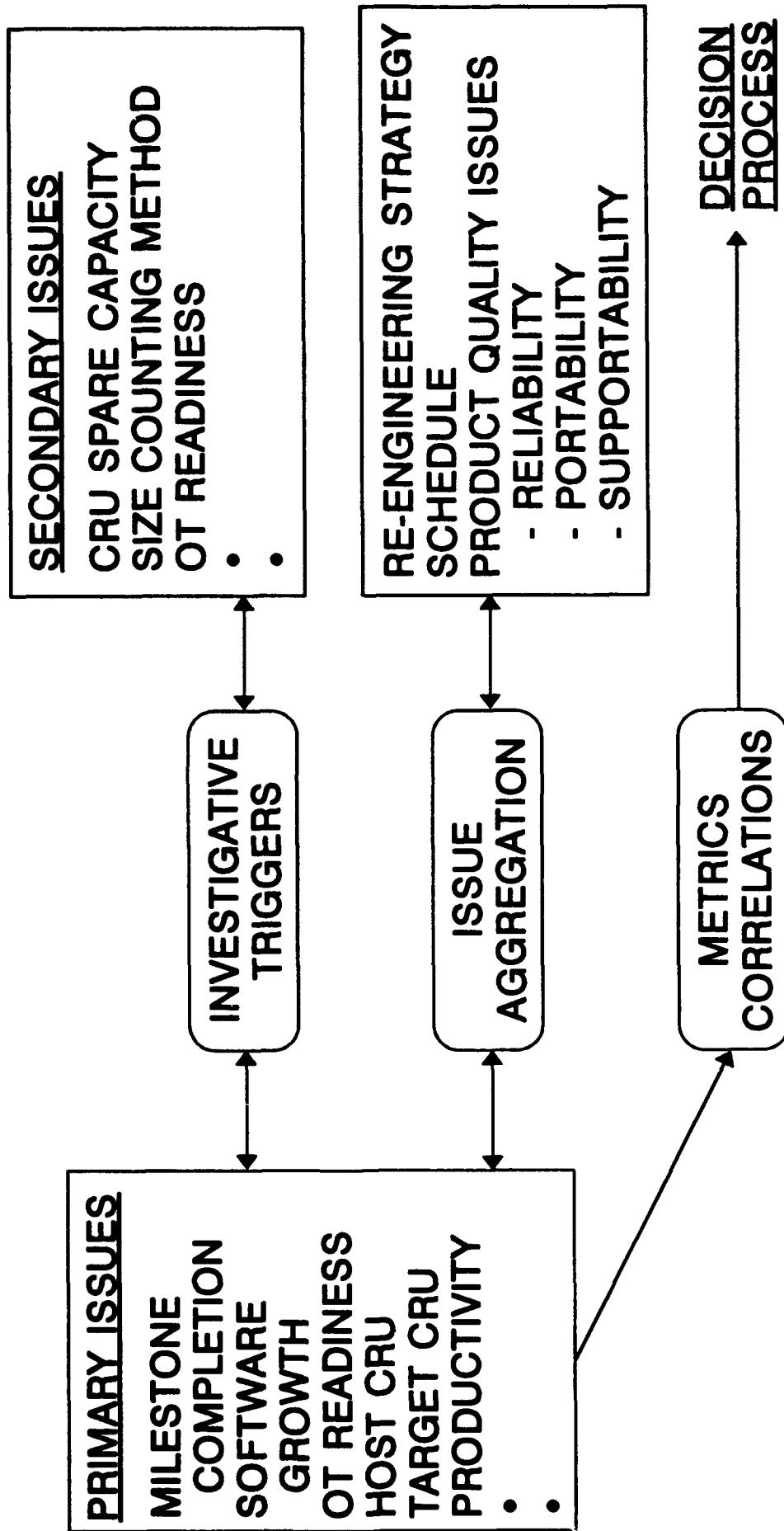
# METRICS PROCESS FRAMEWORK COMPONENTS

- UP-FRONT SYSTEM REQUIREMENTS ANALYSIS
- ISSUE IDENTIFICATION
- DATA VALIDITY/DATA SOURCE VALIDITY
- TAILORING
- CORRELATION ANALYSIS PROCESS

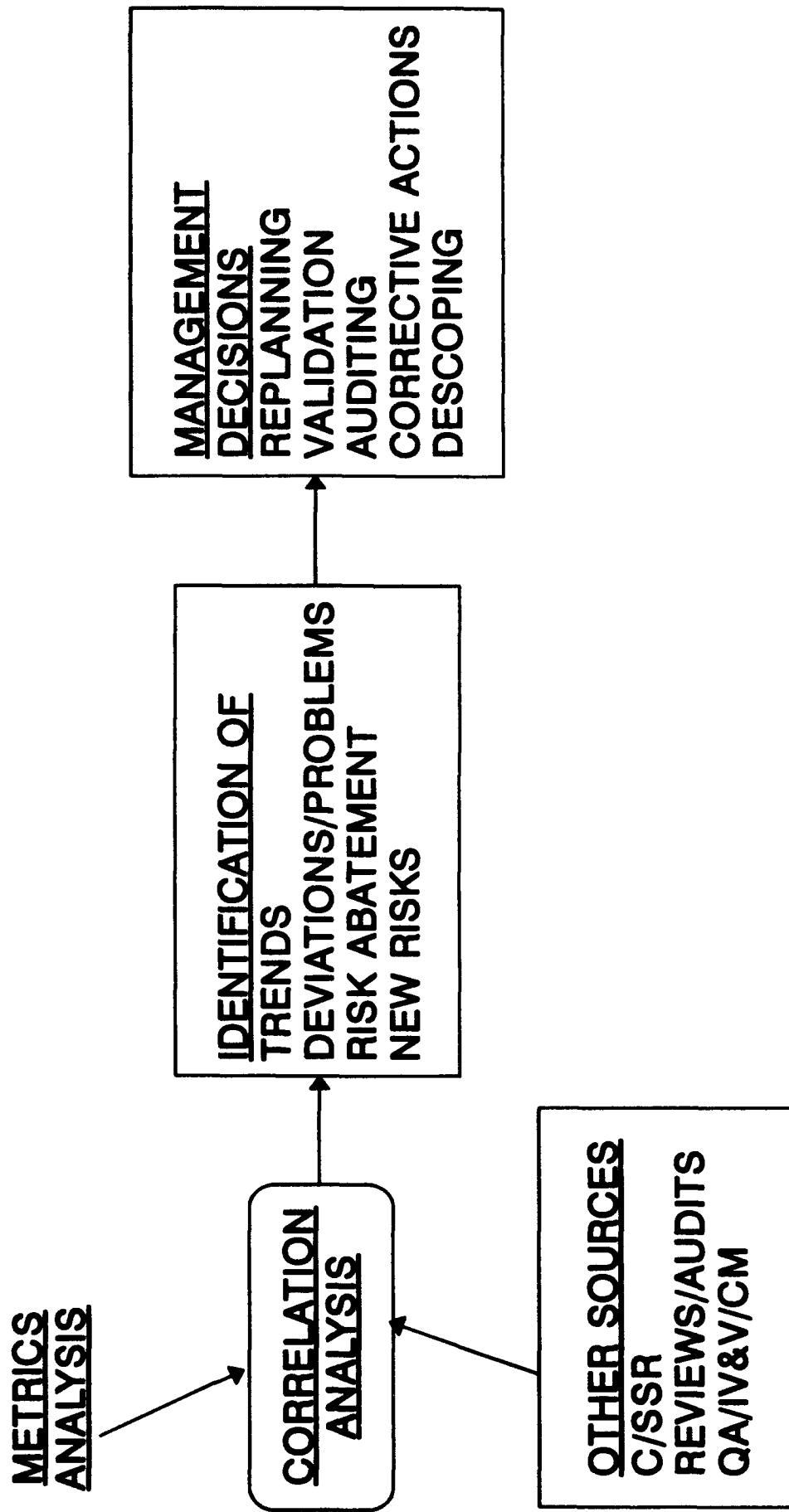
# METRICS PROCESS FRAMEWORK COMPONENTS (Continued)

- EFFICIENT MANAGEMENT STRUCTURE/  
COMMUNICATIONS
- DYNAMIC LIFE-CYCLE APPLICATION
- AUTOMATION/TIMELY REPORTING
- METRICS EXPERTISE
- PROCESS IMPROVEMENT/CAPABILITY  
MATURITY

# METRICS ANALYSIS



# DECISION PROCESS



# ISSUES LIST

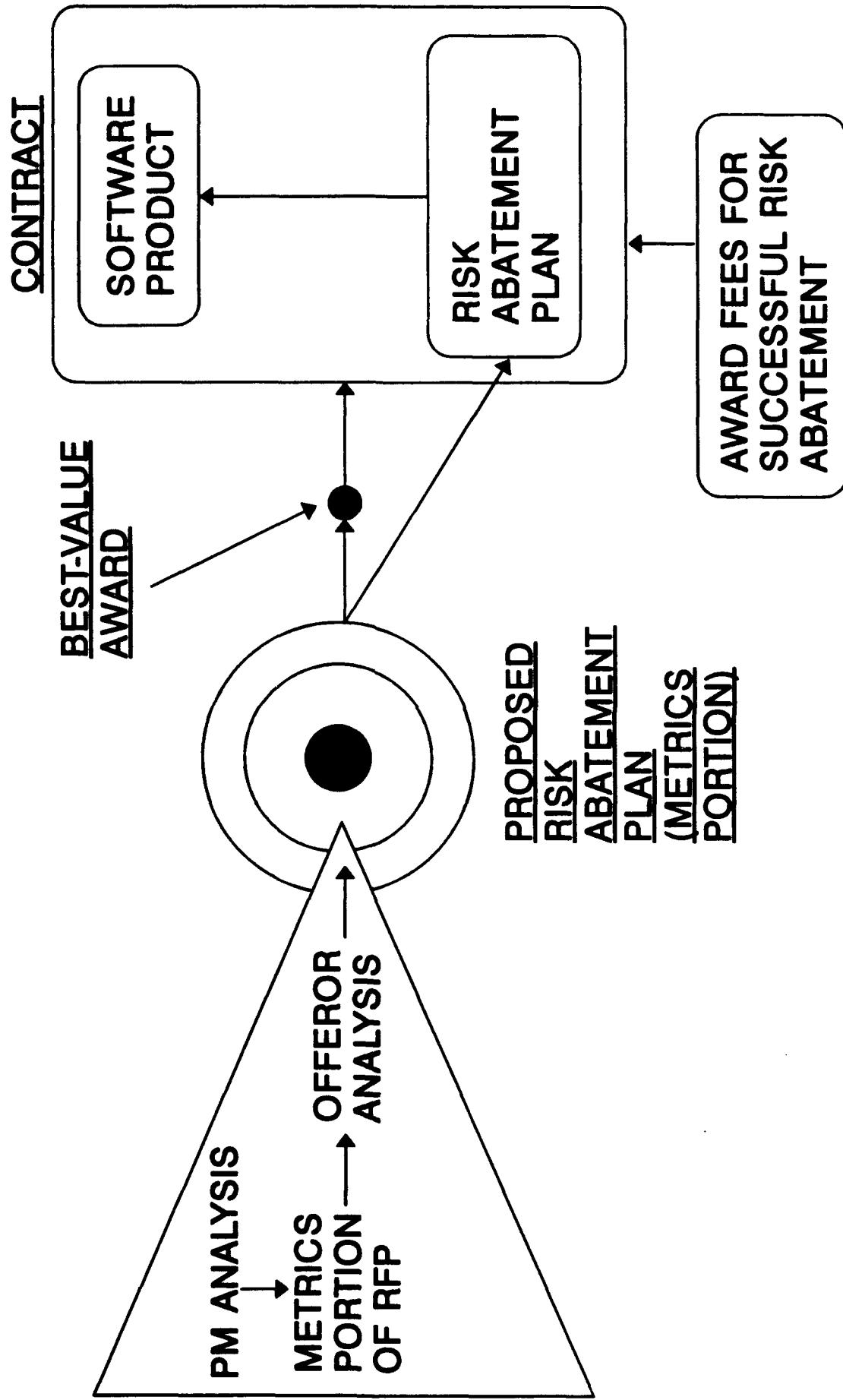
## PRIMARY ISSUES

PLANS & BUDGET  
COST  
PERSONNEL  
SUBCONTRACTOR MANAGEMENT  
INCREMENTAL RELEASE CONTENT  
SYSTEM ARCHITECTURE  
MILESTONE COMPLETION  
SOFTWARE GROWTH  
OT READINESS  
HOST CRU  
TARGET CRU  
STABILITY - REQUIREMENTS & DESIGN  
DESIGN STRUCTURE  
DEVELOPMENT PROGRESS  
REUSE  
PRODUCTIVITY  
ERROR PROFILES  
Ada USAGE

## SECONDARY ISSUES

CSU LEVEL METRICS  
TEST ADEQUACY  
SIZE COUNTING METHOD  
EFFORT PER PHASE  
COMPLEXITY/MODULARITY  
MODULE CRITICALITY  
PCR PRIORITY  
PERSONNEL TURNOVER  
OVERTIME  
CONTRACTOR CAPABILITY  
MANAGEMENT STRUCTURE  
CRU SPARE CAPACITY  
STAFF EXPERIENCE/TRAINING  
ADHERENCE TO STANDARDS  
DESIGN METHODOLOGY  
REUSE LIBRARY  
DOCUMENTATION

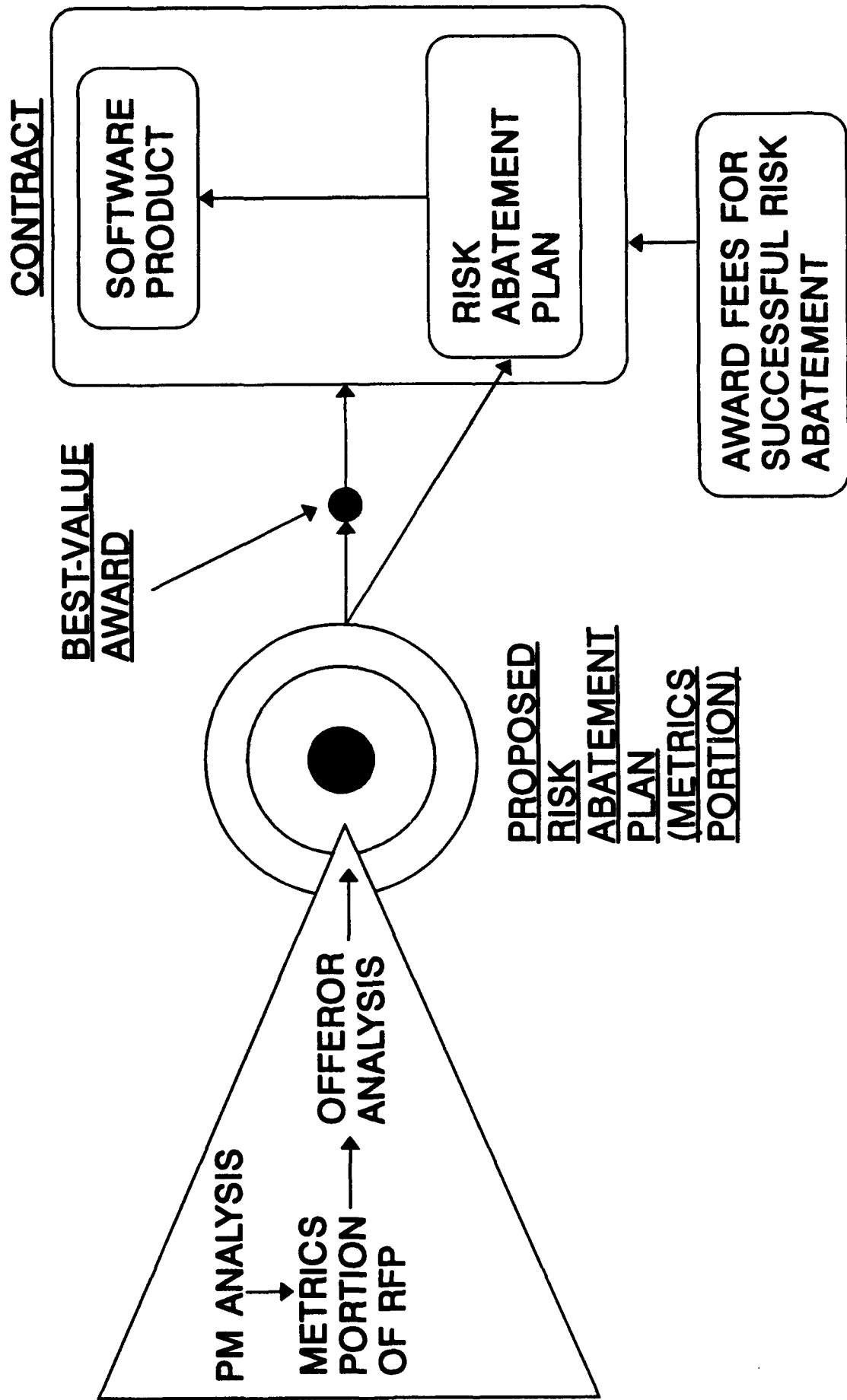
# CECOM'S METRICS APPROACH



# RFP REQUIREMENTS

- OFFERORS EVALUATE GOVERNMENT IDENTIFIED PROGRAM MANAGEMENT ISSUES AND METRICS PROGRAM REQUIREMENTS
- OFFERORS IDENTIFY THEIR OWN PROGRAM MANAGEMENT ISSUES
- OFFERORS PROPOSE RISK MANAGEMENT-BASED METRICS PROGRAM INCORPORATING OFFERORS METRICS METHODOLOGY AND RFP REQUIREMENTS

# CECOM'S METRICS APPROACH



# OFFEROR ANALYSIS SHOULD CONSIDER

- METRICS PORTION OF RFP
- OFFEROR'S PRODUCT PROPOSAL
- STATE-OF-THE-PRACTICE METRICS SETS
- INTERNAL COMPANY PRACTICES

# WHAT DOES CECOM'S METRICS INITIATIVE MEAN TO INDUSTRY

- PROPOSED METRICS PROGRAM WILL BE USED AS PART OF THE PROPOSED RISK ABATEMENT PLAN
- NEED TO LEVERAGE COMPANY METRICS PRACTICES
- CMM-RELATED MEASUREMENT PROCESS IMPROVEMENT SHOULD BE A COMPANY OBJECTIVE
- NEED TO DEVELOP METRICS EXPERTISE

# WHAT DOES CECOM'S METRICS INITIATIVE MEAN TO INDUSTRY

- STREAMLINED MEASUREMENT PRACTICES
  - REDUCE COLLECTION/INJECTION DELAY TIME
  - AUTOMATION/TIMELY REPORTING
  - IMPROVED MANAGEMENT PRACTICES/ COMMUNICATIONS
  - ELECTRONIC DOCUMENTATION/AUDITING
  - UP-FRONT ANALYSIS/UNDERSTANDING OF SYSTEM REQUIREMENTS
  - CAPTURING/DISSEMINATING LESSONS LEARNED
  - TAILORING
  - NEED TO DEVELOP STRATEGIES FOR DEALING WITH ISSUE CHANGES OVER THE LIFE-CYCLE
    - ROBUST DATA SETS; SMART SWAPPING

# METRICS PROGRAM BENEFITS

- COMMUNICATION
  - COMMON PERSPECTIVE, UNDERSTANDING, OBJECTIVES
- VALIDATION
  - OF DATA AND OF INTERPRETATION OF RESULTS
- INCREASED PROGRAM CONTROL
  - NO ROSY PICTURES, NO SURPRISES
  - TRACK RESOURCES, PROGRESS, QUALITY
  - EARLY INSIGHT/USEFUL DECISIONS

# METRICS PROGRAM BENEFITS

- LESSONS LEARNED WILL LEAD TO:
  - PROJECT/PRODUCT IMPROVEMENT
  - PROCESS IMPROVEMENT - ACQUISITION, SOFTWARE, METRICS, MANAGEMENT
  - SMARTER PLANNING AND ESTIMATING
  - IMPROVED REQUIREMENTS DEFINITION/ CONTRACT LANGUAGE
- ORGANIZATIONS WILL IMPROVE/MOVE UP CMM
  - INCREASED CAPABILITIES LESSEN BURDEN OF TECHNICAL RISK

# SUMMARY

- OFFEROR'S METRICS PROGRAM MUST BE INCLUDED IN THE RISK MANAGEMENT PLAN AND WILL ULTIMATELY BE INCORPORATED INTO THE CONTRACT
- OFFERORS SHOULD LEVERAGE EXISTING METRICS SETS AND EXISTING INTERNAL PRACTICES
- OFFERORS SHOULD ENDEAVOR TO ENHANCE THEIR CAPABILITY FOR PROVIDING AN INTEGRATED METRICS STRATEGY TO MEET GOVERNMENT NEEDS

**THE CECOM PHILOSOPHY HAS BEEN CAPTURED AS  
GUIDANCE FOR OUR PEOs AND PMs IN THE -  
"STREAMLINED INTEGRATED SOFTWARE METRICS  
APPROACH (SISMA) GUIDEBOOK - APPLICATION OF  
STEP METRICS"**

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**IT IS AVAILABLE TO INDUSTRY .....**

**TO BE PLACED ON THE DISTRIBUTION LIST, CONTACT:**

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# NOTES

# CECOM SOFTWARE OMBUDSMAN



*Dr. Martin I. Wolfe*

**UNCLASSIFIED**

# FUNCTIONS

- ACT AS FACILITATOR BETWEEN GOVERNMENT/INDUSTRY IN RESOLVING SOFTWARE ENGINEERING ISSUES
- PROMOTE AND HIGHLIGHT CECOM INITIATIVES FOR IMPROVING THE SOFTWARE DEVELOPMENT PROCESS
- IDENTIFY MECHANISMS TO ALLOW AND ENCOURAGE FEEDBACK FROM INDUSTRY
- OPEN UP CHANNELS OF COMMUNICATION WITH INDUSTRY ON ISSUE(S) ASSOCIATED WITH THE SOFTWARE LIFE CYCLE

# TYPICAL AREAS OF CONCERN

- DOCUMENTATION
- REVIEW PROCESS TOO COSTLY
- WAIVERS
- DYNAMIC CHANGES TO REQUIREMENTS
- SOFTWARE MANAGEMENT ISSUES AND CONCERNS

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**OR**

**MS. BARBARA FROMHOLD**



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# **NOTES**

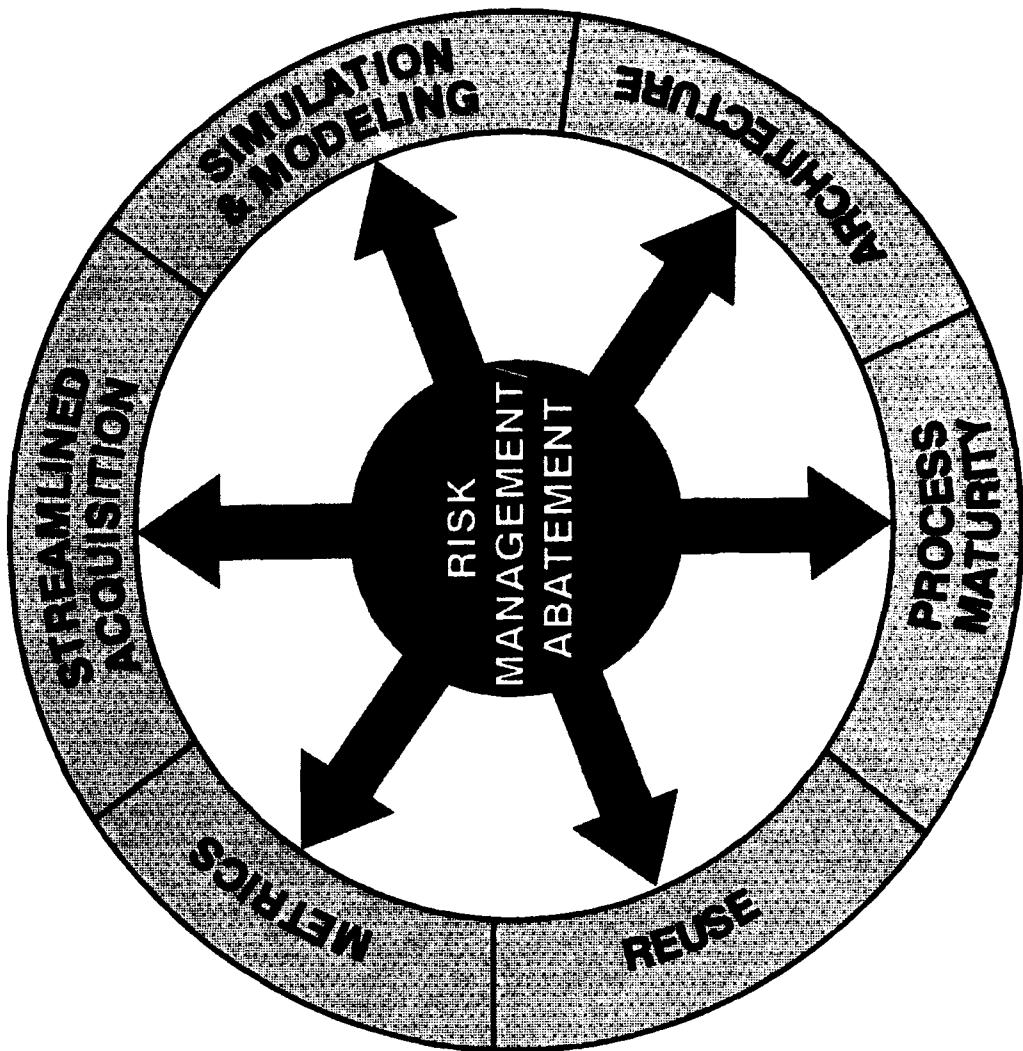
**APBI**  
**CLOSING REMARKS**



*John H. Sintic*

**UNCLASSIFIED**

# A NEW WAY OF DOING BUSINESS



**INDUSTRY AND GOVERNMENT MUST EFFECT "CHANGE" TO MEET THE SOFTWARE CHALLENGES OF THE FUTURE**

# **NOTES**

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